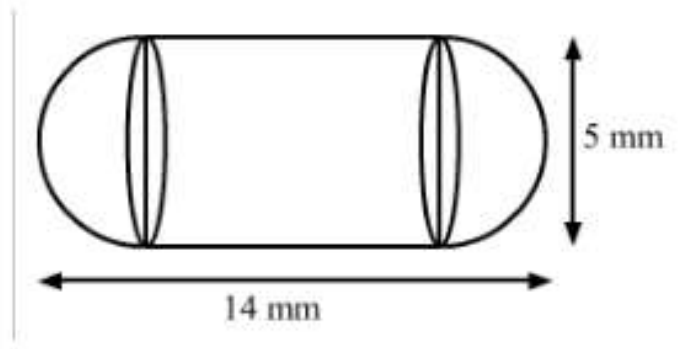


Q.1: A medicine capsule is in the shape of a cylinder with hemispherical struck to each of its end. The length of the entire capsule is 14 mm and the diameter of the capsule is 5 mm. Find the surface area.

Sol:



We have,

The total height of the capsule = 14 mm and

The radius of the capsule, $r = 5/2$ mm

Also, the height of the cylinder, $h = 14 - (2 \times 5/2) = 14 - 5 = 9$ mm

Now, the surface area of the capsule = CSA of the cylinder + 2 × CSA of a hemisphere

$$= 2\pi rh + 2 \times 2\pi r^2$$

$$= 2\pi r (h + 2r)$$

$$= 2 \times 22/7 \times 5/2 \times (9 + 2 \times 5/2)$$

$$= 22/7 \times 5 \times (9 + 5)$$

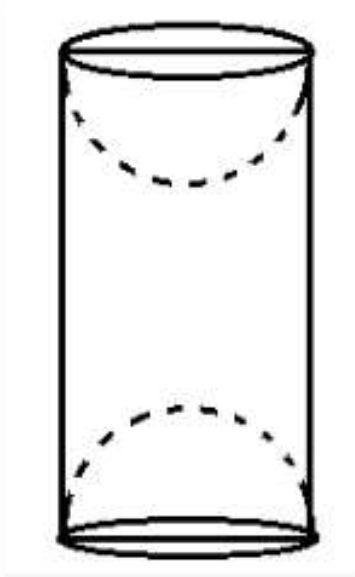
$$= 22/7 \times 5 \times 14$$

$$= 220 \text{ mm}^2$$

So, the surface area of the medicine capsule is 220 mm².

Q.2: A Wooden article was made by scooping out a hemisphere from each end of the cylinder, as shown in the figure. If the height of the cylinder is 20 cm and its base is of diameter 7 cm, find the total surface area of the article when it is ready.

Sol:



Height of cylinder = 20 cm

And diameter = 7 cm and then radius = 3.5 cm

Total surface area of article

= (lateral surface of cylinder with $r = 3.5$ cm and $h = 20$ cm)

$$= [2\pi rh + 2(2\pi r^2)] \text{ sq.units}$$

$$= \left[\left(2 \times \frac{22}{7} \times \frac{7}{2} \times 20 \right) + \left(4 \times \frac{22}{7} \times \frac{7}{2} \times \frac{7}{2} \right) \right] \text{cm}^2$$

$$= (440 + 154) \text{ cm}^2 = 594 \text{ cm}^2$$

QUESTION-1: The dimension of a metallic cuboid are 100cm x 80cm x 64cm. It is melted and recast into a cube. Find the surface area of the cube.

Solution:

Let the edge of the cube be a.

As, Volume of cube = volume of cuboid

$$\Rightarrow a^3 = 100 \times 80 \times 64 \Rightarrow a^3 = 512000 \Rightarrow a = \sqrt[3]{512000}$$
$$\Rightarrow a = 80\text{cm}$$

Now, the surface area of the cube = $6a^2$

$$= 6 \times 80 \times 80$$

$$= 38400 \text{ cm}^2$$

So, the surface area of the cube is 38400cm^2 .

QUESTION-2: A cone of height 20cm and radius of base 5cm is made up of modeling clay. A child reshapes it in the form of a sphere. Find the diameter of the sphere.

Solution:

We have,

The radius of the cone, $r = 5\text{cm}$ and the height of the cone, $h = 20\text{cm}$

Let the radius of the sphere be R.

As,

Volume of sphere = Volume of cone

$$\Rightarrow \frac{4}{3}\pi R^3 = \frac{1}{3}\pi r^2 h \Rightarrow R^3 = \frac{\pi r^2 h \times 3}{3 \times 4\pi} \Rightarrow R^3 = \frac{r^2 h}{4} \Rightarrow R^3 = \frac{5 \times 5 \times 20}{4} \Rightarrow R^3 = 125 \Rightarrow R = \sqrt[3]{125} = 5\text{cm}$$

$$\Rightarrow \text{Diameter of the sphere} = 2R = 2 \times 5 = 10\text{cm}$$

So, the diameter of the sphere is 10cm

QUESTION-1: A hemispherical bowl of internal radius 9cm is full of water. Its contents are emptied into a cylindrical vessel of internal radius 6cm. Find the height of water in the cylindrical vessel.

Solution:

We have,

The radius of the hemispherical bowl, $R = 9\text{cm}$ and

The internal base radius of the cylindrical vessel, $r = 6\text{cm}$

Let the height of the water in the cylindrical vessel be h .

As,

Volume of water in the cylindrical vessel = Volume of hemispherical bowl

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

$$\Rightarrow r^2 h = \frac{2}{3} R^3$$

$$\Rightarrow 6 \times 6 \times h = \frac{2}{3} \times 9 \times 9 \times 9$$

$$\Rightarrow h = \frac{2}{3} \times \frac{9 \times 9 \times 9}{6 \times 6}$$

$$\Rightarrow h = \frac{27}{2}$$

Therefore, $h = 13.5\text{cm}$

So, the height of the water in the cylinder vessel is 13.5cm

QUESTION-2: A hemispherical tank, full of water, is emptied by a pipe at the rate of $25/7$ litres per second. How much time will it take to empty half the tank if the diameter of the base of the tank is 3m?

Solution:

We have,

The radius of the hemispherical tank, $r = 3/2$ m

Volume of the hemispherical tank = $\frac{2}{3} \pi r^3$

$$= \frac{2}{3} \times \frac{22}{7} \times \frac{3}{2} \times \frac{3}{2} \times \frac{3}{2}$$

$$= \frac{99}{14} m^3$$

Now,

Volume of half tank = $\frac{1}{2} \times \frac{99}{14}$

$$= \frac{99}{28} m^3$$

$$= \frac{99}{14} kL$$

$$= \frac{99000}{28} L$$

As, the rate of water emptied by the pipe = $\frac{25}{7}$ L/s

So, the time taken to empty half the tank = $\frac{\left(\frac{99000}{28}\right)}{\left(\frac{25}{7}\right)}$

$$= \frac{99000}{25 \times 4}$$

$$= 990 \text{ s}$$

$$= \frac{990}{60} \text{ min}$$

$$= 16.5 \text{ min}$$

$$= 16 \text{ min } 30 \text{ seconds}$$

So, the time taken to empty half the tank is 16 minutes and 30 seconds.