

### **Exercise 13.4**

**Question :**1 Find the surface area of a sphere of radius:

(i) 10.5 cm

(ii) 5.6 cm

(iii) 14 cm

**Answer:** (i) Radius (r) of sphere = 10.5 cm

Surface area of sphere =  $4\pi r^2$

$$= 4 \times \frac{22}{7} \times 10.5 \times 10.5$$

$$= 88 \times 1.5 \times 10.5$$

$$= 1386 \text{ cm}^2$$

(ii) Radius(r) of sphere = 5.6 cm

Surface area of sphere =  $4\pi r^2$

$$= 4 \times \frac{22}{7} \times 5.6 \times 5.6$$

$$= 88 \times 0.8 \times 5.6$$

$$= 394.24 \text{ cm}^2$$

(iii) Radius (r) of sphere = 14 cm

Surface area of sphere =  $4\pi r^2$

$$= 4 \times \frac{22}{7} \times 14 \times 14$$

$$= 4 \times 44 \times 14$$

$$= 2464 \text{ cm}^2$$

**Question :2** Find the surface area of a sphere of diameter:

(i) 14 cm

(ii) 21 cm

(iii) 3.5 m

**Answer:** (i) Radius (r) of sphere =  $\frac{\text{Diameter}}{2}$

$$= \frac{14}{2}$$

$$= 7 \text{ cm}$$

Surface area of sphere =  $4\pi r^2$

$$= 4 \times \frac{22}{7} \times 7 \times 7$$

$$= 88 \times 7$$

$$= 616 \text{ cm}^2$$

(ii) Radius (r) of sphere =  $\frac{\text{Diameter}}{2}$

$$= \frac{21}{2}$$

$$= 10.5 \text{ cm}$$

Surface area of sphere =  $4\pi r^2$

$$= 4 \times \frac{22}{7} \times 10.5 \times 10.5$$

$$= 1386 \text{ cm}^2$$

(iii) Radius (r) of sphere =  $\frac{\text{Diameter}}{2}$

$$= \frac{3.5}{2}$$

$$= 1.75 \text{ m}$$

Surface area of sphere =  $4\pi r^2$

$$= 4 \times \frac{22}{7} \times 1.75 \times 1.75$$

$$= 38.5 \text{ cm}^2$$

**Question :3** Find the total surface area of a hemisphere of radius 10 cm.  
(Use  $\pi = 3.14$ )

**Answer:** Radius (r) of hemisphere = 10 cm

Total surface area of hemisphere = CSA of hemisphere + Area of circular end of hemisphere

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

$$= 3\pi r^2$$

$$= [3 * 3.14 * 10 * 10]$$

$$= 942 \text{ cm}^2$$

**Question :4** The radius of a spherical balloon increases from 7 cm to 14 cm as air is being pumped into it. Find the ratio of surface areas of the balloon in the two cases

**Answer:**

Radius ( $r_1$ ) of spherical balloon = 7 cm

Radius ( $r_2$ ) of spherical balloon, when air is pumped into it = 14 cm

$$\text{Ratio} = \frac{\text{Initial surface area}}{\text{Surface area after pumping ballon}}$$

$$= \frac{4\pi r_1 \times r_1}{4\pi r_2 \times r_2}$$

$$= \left(\frac{r_1}{r_2}\right)^2$$

$$= \left(\frac{7}{14}\right)^2 = \frac{1}{4}$$

Therefore, the ratio between the surface areas is 1:4

**Question :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 Rs 16 per 100 cm<sup>2</sup>

**Ans.:** Inner radius (r) =  $\frac{10.5}{2} = 5.25$  cm

Surface area of hemispherical bowl =  $2\pi r^2$

$$= 2 * \frac{22}{7} * 5.25 * 5.25$$

$$= 173.25 \text{ cm}^2$$

Cost of tin-plating 100 cm<sup>2</sup> area = Rs 16

$$\text{Cost of tin-plating } 173.25 \text{ cm}^2 \text{ area} = \left( \frac{16 * 173.25}{100} \right)$$

$$= \text{Rs } 27.72$$

**Question :6** Find the radius of a sphere whose surface area is 154 cm<sup>2</sup>.

**Ans.:**

Let the radius of the sphere be r

Surface area of sphere = 154 cm<sup>2</sup>

$$4 \pi r^2 = 154$$

$$r^2 = \frac{154}{4\pi}$$

$$\Rightarrow r^2 = \frac{154 \times 7}{4 \times 22}$$

$$\Rightarrow r^2 = \frac{7}{4 \times 22} \times 154$$

$$\Rightarrow r^2 = \frac{49}{1}$$

$$\Rightarrow r^2 = 12.25$$

$$\begin{array}{r|l} & 3.5 \\ 3 & 12.25 \\ & 9 \\ \hline 65 & 3.25 \\ & 3.25 \\ \hline & 0 \end{array}$$

$$\Rightarrow r = 3.5$$

Therefore, the radius of the sphere whose surface area is  $154 \text{ cm}^2$  is  $3.5 \text{ cm}$

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

**Ans.:** Let the diameter of earth be  $d$ . Therefore, the diameter of moon will be  $\frac{d}{4}$

$$\text{Radius (Earth)} = \frac{d}{2}$$

$$\text{Radius (Moon)} = \frac{1}{2} \times \frac{d}{4} = \frac{d}{8}$$

$$\text{Surface Area of moon} = 4\pi \left(\frac{d}{8}\right)^2$$

$$\text{Surface Area of Earth} = 4\pi \left(\frac{d}{2}\right)^2$$

$$\text{Ratio} = \frac{\text{Surface Area of moon}}{\text{Surface Area of Earth}}$$

$$= \frac{4\pi \frac{d}{64}}{4\pi \frac{d}{4}}$$

$$= \frac{4}{64}$$

$$= \frac{1}{16}$$

**Question :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.

**Ans.:** The inner radius of hemispherical bowl = 5 cm

The thickness of the bowl = 0.25 cm

Outer radius (r) of hemispherical bowl = (5 + 0.25) cm

= 5.25 cm

Outer CSA of hemispherical bowl =  $2\pi r^2$

=  $2 \times \pi \times (5.25)^2$

= 173.25 cm<sup>2</sup>

**Question :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

**Ans.:** (i) Surface area of sphere =  $4\pi r^2$

(ii) Height of cylinder =  $r + r = 2r$

[As sphere touches both upper and lower surface of cylinder]

Radius of cylinder =  $r$

CSA of cylinder =  $2\pi rh$

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

$$= 4\pi r^2$$

$$(iii) \text{ Ratio} = \frac{4\pi r \times r}{4\pi r \times r}$$

$$= \frac{1}{1} = 1$$

$$\text{Ratio} = 1:1$$