Exercise 13.4

Q.Sum 13.4 Find the surface area of a sphere of radius (i) 10.5cm (ii) 5.6cm (iii) 14cm

Sol (i) Radius = 10.5cm

Total surface area of sphere = $4\pi r^2$

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

$= 4 \times \frac{22}{\cancel{7}_{1}} \times \frac{\cancel{105}^{15}}{10} \times \frac{105}{10}$

$= \frac{138600}{\cancel{100}} \text{ cm}^2$

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

(ii) Radius = 5.6cm

Total surface area of sphere = $4\pi r^2$

$= 4 \times \frac{22}{7} \times (5.6)^2$

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

$= 4 \times \frac{22}{\cancel{7}_{1}} \times \cancel{5.6}^{0.8} \times 5.6$

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

(iii) Radius = 14cm

Total surface area of sphere = $4\pi r^2$

$= 4 \times \frac{22}{7} \times (14)^2$

$= 4 \times \frac{22}{\cancel{7}} \times \cancel{14}^{2} \times 14$

$= 246.4 \text{cm}^2$ Ans

Example 13.4: Find the Surface area of a Sphere of diameter: (i) 14cm (ii) 21cm (iii) 3.5m

Sol: (i) Diameter of sphere = 14cm

radius of sphere = $\frac{14}{2}$ cm = 7cm

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

$= 4 \times \frac{22}{7} \times (7)^2$

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

$= 616\ cm^2$ Ans

(ii) Diameter of sphere = 21cm

radius of sphere = $\frac{21}{2}$ cm

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

$= 4 \times \frac{22}{7} \times \left(\frac{21}{2}\right)^2$

$= \cancel{4} \times \frac{22}{\cancel{7}} \times \frac{\cancel{21}^3}{\cancel{2}} \times \frac{21}{\cancel{2}}$

$= 1386\ cm^2$ Ans

(iii) Diameter of sphere = 3.5cm

radius of sphere = $\frac{3.5}{2}$ cm

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

$= 4 \times \frac{22}{7} \times \left(\frac{3.5}{2}\right)^2$

$= \cancel{4} \times \frac{22}{7} \times \frac{3.5}{\cancel{2}} \times \frac{3.5}{\cancel{2}}$

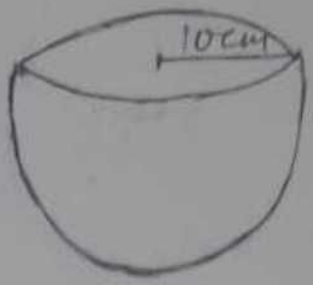
$= \frac{22}{7} \times \frac{\cancel{35}^5}{10} \times \frac{35}{10}$

$= \frac{3850}{100} = 38.5\ cm^2$

Ans

3Sum: Find the total surface area of a hemisphere of radius 10cm

Sol:- radius : 10cm



Total surface area of hemisphere =

$= 3\pi r^2$

$= 3 \times 3.14 \times (10)^2$

$= 3 \times 3.14 \times 10 \times 10$

$= 3 \times \frac{314}{100} \times 10 \times 10$

$= 942\ cm^2$ Ans

Exam 13.4 : 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 balloons in the two cases.

Sol :

Radius (r) = 7 cm

Radius (R) = 14 cm

Surface area of Spherical balloon ; Surface area of Spherical balloon.

$4\pi r^2 : 4\pi R^2$

$(7)^2 : (14)^2$

$\pi \times \pi : \frac{14}{2} \times \frac{14}{2}$

$1 : 4$. Ans

5 Sum :- 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 $100 cm^2$.

Sol :- diameter = 10.5 cm

radius (r) = $\frac{10.5}{2}$

Curved surface area of bowl = $2\pi r^2$

$= 2 \times \frac{22}{7} \times \left(\frac{10.5}{2}\right)^2$

$= 2 \times \frac{11}{\cancel{22}} \times \frac{\cancel{10.5}^{1.5}}{\cancel{2}} \times \frac{10.5}{2}$

$= 11 \times 1.5 \times 10.5$

$= 173.25 cm^2$

Cost of tin plating inside of $100 cm^2$ = Rs 16

Cost of tin plating inside of $1 cm^2$ = Rs $\frac{16}{100}$

Cost of tin plating inside of $173.25 cm^2$ =

= Rs $\frac{16}{100} \times 173.25$

= Rs 27.72 Ans

Problem:- Find the radius of a sphere whose surface area is $154 cm^2$

Sol:

Surface area of Sphere $= 154 cm^2$

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

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

$$r^2 = 154 \times \frac{7}{22} \times \frac{1}{4}$$

$$r^2 = \frac{7 \times 7}{2 \times 2}$$

$$r = \sqrt{\frac{7 \times 7}{2 \times 2}} = \frac{7}{2} cm$$

$r = \frac{7}{2} cm$: Ans

7 Sum 13.4 : The diameter of the moon is approximately one fourth of the diameter of the earth. Find the ratio of their surface area.

Sol :- Let the diameter of earth = x cm

the diameter of moon = $\frac{1}{4} \times x$ cm

$= \frac{x}{4}$ cm

radius of earth (r_1) = $\frac{x}{2}$ cm

radius of moon (r_2) = $\frac{1}{2} \times \frac{x}{4} = \frac{x}{8}$ cm

$$\text{Ratio} = \frac{\text{surface area of moon}}{\text{surface area of earth}}$$

$$\text{Ratio} = \frac{4\pi r_2^2}{4\pi r_1^2}$$

$$= \frac{4\pi r_2^2}{4\pi r_1^2} = \frac{r_2^2}{r_1^2}$$

$$= \frac{\left(\frac{x}{8}\right)^2}{\left(\frac{x}{2}\right)^2}$$

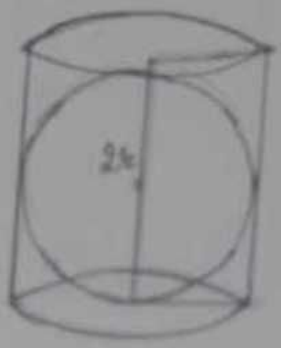
$$= \frac{\frac{x^2}{64}}{\frac{x^2}{4}}$$

$$= \frac{x^2}{64} \times \frac{4}{x^2} = \frac{1}{16}$$

$= 1 : 16$ Ans

Q.Sum 13.4 : A right circular cylinder just encloses a sphere of radius r. Find (i) Surface area of the sphere (ii) Curved Surface area of cylinder (iii) ratio of the areas obtained in (i) and (ii).

Sol. radius
Height of cylinder $= 2r$



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

(ii) Curved Surface area of cylinder

$= 2\pi rh$

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

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

$= 4\pi r^2$

(iii) Ratio :- $\frac{\text{Surface area of sphere}}{\text{Curved Surface area of cylinder}}$

$= \frac{4\pi r^2}{4\pi r^2} = \frac{1}{1}$

$= 1:1$ Ans