Surface Areas and Volumes: Exercise 13.4

Q.1 Find the surface area of a sphere of radius:
(i) 10. 5 cm (ii) 5.6 cm (iii) 14 cm
Sol.
(i) Given: let r = 10.5 be the radius of the sphere.
Therefore, surface area = $4\pi r^2$

$$= (4 \times \frac{22}{7} \times 10.5 \times 10.5)\ cm^2$$
$$= 1386\ cm^2$$

(ii) Given: let r =5.6 cm be the radius of sphere.
Therefore, surface area = $4\pi r^2$

$$= (4 \times \frac{22}{7} \times 5.6 \times 5.6)\ cm^2$$
$$= 394.24\ cm^2$$

(iii) Given: let r = 14 cm be the radius of sphere.
Therefore, surface area = $(4 \times \frac{22}{7} \times 14 \times 14)\ cm^2$

$$= 2464\ cm^2$$

Q.2 Find the surface area of a sphere of diameter:
(i) 14 cm (ii) 21 cm (iii) 3.5 m
Sol.
(i) Given: Let r = 14/2 = 7 cm be the radius of sphere
Therefore, surface area = $4\pi r^2$

$$= (4 \times \frac{22}{7} \times 7 \times 7)\ cm^2$$
$$= 616\ cm^2$$

(ii) Given: Let r = 21/2 = 10.5 cm be the radius of sphere
Therefore, surface area = $4\pi r^2$

$$= (4 \times \frac{22}{7} \times 10.5 \times 10.5)\ cm^2$$
$$= 1386\ cm^2$$

(iii) Given: Let r = 3.5/2 = 1.75 m be the radius of sphere
Therefore, surface area = $4\pi r^2$

$$= (4 \times \frac{22}{7} \times 1.75 \times 1.75)\ m^2$$
$$= 38.5\ m^2$$

Q.3 Find the total surface area of a hemisphere of radius 10 cm (Use π=3.14)

Sol. **Given:** let r = 10 cm be the radius of hemisphere.

Therefore, total surface area of hemisphere = $3\pi r^2$

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

$= 942\ cm^2$

Thus, the total surface area of a hemisphere = $942\ cm^2$

Q.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.

Sol. **Given:** Let $r_1 = 7$ cm and $r_2 = 14$ be the radius of balloons in the two cases as sir is being pumped into it.

So, ratio of their surface area = $\frac{4\pi r_1^2}{4\pi r_2^2} = \frac{r_1^2}{r_2^2}$

Now, putting the value of r_1 and r_2 = $\frac{7 \times 7}{14 \times 14} = \frac{1}{4}$

Hence, the required ratio of surface areas in two cases = 1 : 4

Q.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 cm²

Sol. **Given:** let r =10.5/2 = 5.25 cm be the inner radius of hemispherical bowl.

Therefore, curved surface area of the hemisphere = $2\pi r^2$

$= (2 \times \frac{22}{7} \times 5.25 \times 5.25)\ cm^2$

$= 173.25\ cm^2$

Since, rate of tin - plating inside the hemisphere is Rs 16 per 100 cm^2.

So, cost of tin - plating the hemisphere = $(173.25 \times \frac{16}{100})$

= Rs.27.72

Thus, cost of tin - plating the inside the hemisphere = Rs.27.72

Q.6 Find the radius of a sphere whose surface area is 154 cm².

Sol. **Given:** surface area of sphere = 154 cm^2

Let r be the radius of the sphere.

Therefore, surface area = 154 cm^2

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

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

$\Rightarrow \quad r^2 = \frac{154 \times 7}{4 \times 22} = 12.25$

$\Rightarrow \quad r = \sqrt{12.25}$

$= 3.5$

Hence, the radius of the sphere = 3.5 cm

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

Sol. Let R be the diameter of earth and $\frac{R}{4}$ be the radius of the moon.

So, the radii of earth and moon are $\frac{R}{2}$ and $\frac{R}{8}$ respectively.

Therefore, ratio of their surface area = $\frac{4\pi\left(\frac{R}{8}\right)^2}{4\pi\left(\frac{R}{2}\right)^2} = \frac{\frac{1}{64}}{\frac{1}{4}}$

$= \frac{1}{16}$

Thus, the ratio of their surface areas of moon and earth = 1:16

Q.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.

Sol. **Given:** Let r = 5 cm be the inner radius and d = 0.25 cm be the thickness of steel.

So, outer radius R = (5 + 0.25) cm

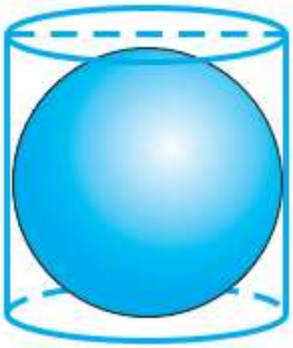
= 5.25

Now, outer curved surface = $2\pi R^2$

$= (2 \times \frac{22}{7} \times 5.25 \times 5.25)\ cm^2$

$=173.25\ cm^2$

Q.9 A right circular cylinder just encloses a sphere of radius r (see figure). Find



(i) Surface area of the sphere,
(ii) Curved surface area of the cylinder,
(iii) Ratio of the areas obtained in (i) and (ii).

Sol. **Given:** r is the radius of sphere which is enclosed by cylinder of height h = 2r.

(i) Therefore, surface area = $4\pi r^2$

(ii) And curved surface of cylinder = $2\pi r\ h$

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

$= 4\pi r^2$

(iii) Thus, Ratio of area = $4\pi r^2 : 4\pi r^2$

= 1:1