SpeedLabs

MATHS

CBSE 9th

TEEVRA EDUTECH PVT. LTD.

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

Assume $\pi = \frac{22}{7}$

Ans - **(i)** Radius (r) of sphere = 10.5 cm

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

$= \left[4 \times \frac{22}{7} \times (10.5)^2\right] cm^2$

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

$= (88 \times 1.5 \times 10.5) cm^2$

$= 1386\ cm^2$

Therefore, the surface area of a sphere having radius 10.5cm is 1386 cm^2.

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

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

$= \left[4 \times \frac{22}{7} \times (5.6)^2\right] cm^2$

$= (88 \times 8.5 \times 15.6) cm^2$

$= 394.24\ cm^2$

Therefore, the surface area of a sphere having radius 5.6 cm is 394.24 cm^2.

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

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

$\left[4 \times \frac{22}{7} \times (14)^2\right] cm^2$

$= (4 \times 44 \times 14) cm^2$

$= 2464\ cm^2$

Therefore, the surface area of a sphere having radius 14 cm is 2464 cm^2.

Q.2 Find the surface area of a sphere of diameter:

(i) 14 cm **(ii)** 21 cm **(iii)** 3.5 m

Assume $\pi = \frac{22}{7}$

Ans - **(i)** Radius (r) of sphere $= \frac{\text{Diameter}}{2} = \left(\frac{14}{2}\right)\text{cm} = 7\text{cm}$

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

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

$= (88 \times 7)\text{cm}^2$

$= 616\text{cm}^2$

Therefore, the surface area of a sphere having diameter 14 cm is 616 cm^2.

(ii) Radius (r) of sphere $= \frac{21}{2} = 10.5$ cm

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

$= \left[4 \times \frac{22}{7} \times (10.5)^2\right]\text{cm}^2$

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

Therefore, the surface area of a sphere having diameter 21 cm is 1386 cm^2.

(iii) Radius (r) of sphere $= = \frac{3.5}{2} = 1.75$ cm

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

$= \left[4 \times \frac{22}{7} \times (1.75)^2\right]\text{cm}^2$

$= 9 = 38.5\ \text{m}^2$

Therefore, the surface area of the sphere having diameter 3.5 m is 38.5 m^2.

Q.3 Find the total surface area of a hemisphere of radius 10 cm. [Use $\pi = 3.14$]

Ans -

Radius (r) of hemisphere $= 10$ cm

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

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

$= 3\pi r^2$

$= [3 \times 3.14 \times (10)^2]\text{cm}^2$

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

Therefore, the total surface area of such a hemisphere is 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.

Ans - Radius (r_1) of spherical balloon = 7 cm

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

$$\text{Required ratio} = \frac{\text{Initial surface area}}{\text{Surface area after pumping air into balloon}} = \frac{4\pi r_1^2}{4\pi r_2^2} = \left(\frac{r_1}{r_2}\right)^2$$

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

Therefore, the ratio between the surface areas in these two cases is 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 cm^2.

Assume $\pi = \frac{22}{7}$

Ans - Inner radius (r) of hemispherical bowl $= \left(\frac{10.5}{2}\right)$ cm = 5.25 cm

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

$$= \left[4 \times \frac{22}{7} \times (5.25)^2\right] cm^2$$

$= 173.25\ cm^2$

Cost of tin-plating 100 cm^2 area = Rs 16

Cost of tin-plating 173.25 cm^2 area $= \frac{16 \times 173.25}{100}$ = Rs 27.72

Therefore, the cost of tin-plating the inner side of the hemispherical bowl is Rs 27.72.

Q.6 Find the radius of a sphere whose surface area is 154 cm^2.

Assume $\pi = \frac{22}{7}$

Ans - Let the radius of the sphere be r.

Surface area of sphere = 154

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

$$r^2 = \left(\frac{154 \times 7}{4 \times 22}\right) cm^3 = \left(\frac{7 \times 7}{2 \times 2}\right) cm^2$$

$$r = \left(\frac{7}{2}\right) cm = 3.5\ cm$$

Therefore, the radius of the sphere whose surface area is 154 cm^2 is 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 area.

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

Radius of earth $= \frac{d}{2}$

Radius of moon $= \frac{1}{2} \times \frac{d}{4} \times \frac{d}{8}$

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

Surface area of earth $= 4\pi \left(\frac{d}{2}\right)^2$

Required ratio $= \frac{4\pi \left(\frac{d}{8}\right)^2}{4\pi \left(\frac{d}{2}\right)^2}$

$= \frac{4}{64} = \frac{1}{16}$

Therefore, the ratio between their surface areas will be 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.

Assume $\pi = \frac{22}{7}$

Ans - Inner radius of hemispherical bowl $= 5$ cm

Thickness of the bowl $= 0.25$ cm

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

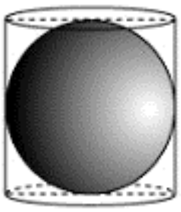
$= 5.25$ cm

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

$= 2 \times \frac{22}{7} \times (5.25\text{cm})^2 = 173.25\text{cm}^2$

Therefore, the outer curved surface area of the bowl is 173.25 cm^2.

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

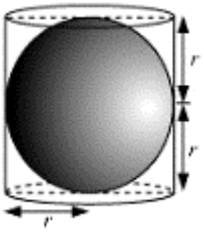


(i) surface area of the sphere,

(ii) curved surface area of the cylinder,

(iii) ratio of the areas obtained in (i) and (ii).

Ans -



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

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

Radius of cylinder $= r$

CSA of cylinder $= 2\pi rh$

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

$= 4\pi r^2$

(**iii**)Required ratio $= \dfrac{\text{Surface area of sphere}}{\text{CSA of cylinder}}$

$= \dfrac{4\pi r^2}{4\pi r^2}$

$= \dfrac{1}{1}$

Therefore, the ratio between these two surface areas is 1:1.