Mathematics

(Chapter – 13) (Surface Areas and Volumes)

(Class – IX)

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) r = 10.5 cm

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

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

$= 4 \times \dfrac{22}{7} \times 10.5 \times 10.5$ cm^2 **= 1386 cm² Ans.**

(ii) r = 5.6 cm

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

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

$= 4 \times \dfrac{22}{7} \times 5.6 \times 5.6$ cm^2 **= 394.24 cm² Ans.**

(iii) r = 14 cm

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

$= 4 \times \dfrac{22}{7} \times 14 \times 14$ cm^2

$= 88 \times 28$ cm^2 **= 2464 cm² Ans.**

Q.2. *Find the surface area of sphere of a diameter :*
   (i) 14 *cm*   *(ii)* 21 *cm*   *(iii)* 3.5 *m*

Sol.   (i) $r = \dfrac{14}{2}$ cm = 7 cm

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

$= 4 \times \dfrac{22}{7} \times 7^2$ cm^2

$= 4 \times \dfrac{22}{7} \times 7 \times 7$ cm^2

88×7 cm^2 **= 616 cm² Ans.**

(ii) $r = \dfrac{21}{2}$ cm = 10.5 cm

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

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

$= 4 \times \dfrac{22}{7} \times 10.5 \times 10.5$ cm^2 **= 1386 cm² Ans.**

(iii) $r = \dfrac{3.5}{2}$ m = 1.75 m

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

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

$= 4 \times \dfrac{22}{7} \times 1.75 \times 1.75$ m^2 **= 38.5 m² Ans.**

Mathematics

(Chapter – 13) (Surface Areas and Volumes)

(Class – IX)

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

Sol. r = 10 cm

Total surface area of the hemisphere = $3\pi r^2$

= 3 × 3.14 × $(10)^2$ cm^2

= 3 × 3.14 × 100 cm^2 = **942 cm^2 Ans.**

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. **When r = 7 cm**

Surface area of the balloon = $4\pi r^2$

= 4 × π × 7 × 7 cm^2

When R = 14 cm :

Surface area of the balloon = $4\pi r^2$

= 4 × π × 14 × 14 cm^2

Required ratio of the surface areas of the balloon

$$= \frac{4 \times \pi \times 7 \times 7}{4 \times \pi \times 14 \times 14} = \frac{1}{4} = \textbf{1 : 4 Ans.}$$

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.*

Sol. Here r = $\dfrac{10.5}{2}$ cm = 5.25 cm

Inner surface area of the bowl = $2\pi r^2$

= 2 × $\dfrac{22}{7}$ × $(5.25)^2$ cm^2

= 44 × 0.75 × 5.25 cm^2 = 173.25 cm^2

Cost of tin plating 100 cm^2 = Rs 16

Cost of tin plating 173.25 cm^2 = Rs $\dfrac{16}{100}$ × 173.25 = **Rs 27.72 Ans.**

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

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

⇒ 154 = 4 × $\dfrac{22}{7}$ × r^2

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

⇒ r = $\dfrac{7}{2}$ = 3.5

Hence, radius of the sphere **= 3.5 cm Ans.**

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 diameter of the earth = $2r$

Then radius of the earth = r

∴ Diameter of the moon = $\dfrac{2r}{4} = \dfrac{r}{2}$

Mathematics

(www.tiwariacademy.com)

(Chapter – 13) (Surface Areas and Volumes)

(Class – IX)

$\therefore$ Radius of the moon = $\dfrac{r}{4}$

Now, surface area of the moon = $4\pi \left(\dfrac{r}{4}\right)^2$

$= \dfrac{\pi r^2}{4}$ ... (i)

Surface area of the earth $= 4\pi r^2$ ... (ii)

$\therefore$ Required ratio = $\dfrac{\dfrac{\pi r^2}{4}}{4\pi r^2} = \dfrac{\pi r^2}{4\times 4\pi r^2} = \dfrac{1}{16}$ **= 1 : 16 Ans.**

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. Inner radius of the bowl (r) = 5 cm

Thickness of the steel = 0.25 cm

$\therefore$ Outer radius of the bowl (R) = (5 + 0.25) cm = 5.25 cm

Outer curved surface area of the bowl

$= 2\pi R^2 = 2 \times \dfrac{22}{7} \times (5.25)^2$ cm^2 **= 173.25 cm^2 Ans.**

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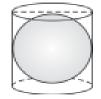
(iii) ratio of the areas obtained in (i) and (ii).

Sol. Here, radius of the sphere = r

Radius of the cylinder = r

And, height of the cylinder = $2r$

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

(ii) Curved surface area of the cylinder = $2\pi rh$

$2\pi \times r \times 2r = 4\pi r^2$ **Ans.**

(iii) Required ratio $= \dfrac{4\pi r^2}{4\pi r^2} = \dfrac{1}{1}$