NCERT solutions for class-9 maths surface areas and volumes Ex 13.4

Assume $\pi = \frac{22}{7}$ unless stated otherwise.

Q1. Find the surface area of a sphere of radius:

(i) 10.5 cm

(ii) 5.6 cm

(iii) 14 cm

Ans: (i) Radius of sphere = 105 cm

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

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

(ii) Radius of sphere = 5.6 m

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

$= 4 \times \frac{22}{7} \times 5.6 \times 5.6 = 3.94.84 \text{ m}^2$

(iii) Radius of sphere = 14 cm

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

$= 4 \times \frac{22}{7} \times 14 \times 14 = 2464 \text{ cm}^2$

Q2. Find the surface area of a sphere of diameter:

(i) 14 cm

(ii) 21 cm

(iii) 3.5 cm

Ans: (i) Diameter of sphere = 14 cm,

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

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

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

(ii) Diameter of sphere = 21 cm

$\therefore$ Radius of sphere = $\frac{21}{2}$ cm

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

$= 4 \times \frac{22}{7} \times \frac{21}{2} \times \frac{21}{2} = 1386 \text{ cm}^2$

$= \frac{\quad}{7} \quad 2 \quad 2 \quad = 1380$ cm

(iii) Diameter of sphere = 3.5 cm

$\therefore$ Radius of sphere = $\frac{3.5}{2}$ = 1.75 cm

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

= $4 \times \frac{22}{7} \times 1.75 \times 1.75$ = 38.5 cm^2

Q3. Find the total surface area of a hemisphere of radius 10 cm.

(Use $\pi = 3.14$)

Ans: Radius of hemisphere (r) = 10 cm

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

= 3 x 3.14 x 10 x 10 = 942 cm^2

Hence total surface area of hemisphere is

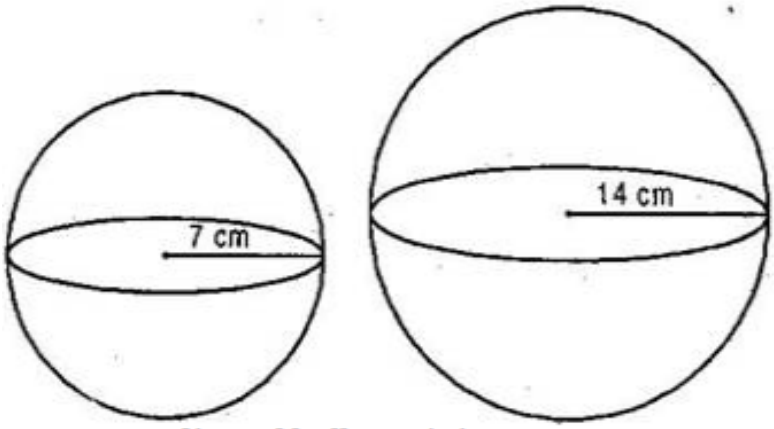
942 cm^2.

Q4. 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: I case: Radius of balloon (r) = 7 cm

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

= $4\pi \times 7 \times 7$ cm^2.....(i)



II case: Radius of balloon (R) = 14 cm

Surface area of balloon = $4\pi R^2$

= $4\pi \times 14 \times 14$ cm2 .....(ii)

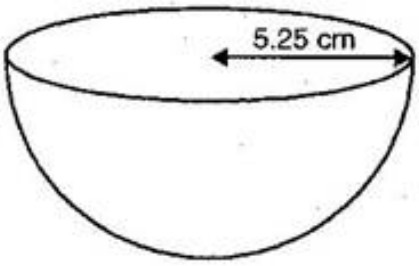
Now, Ratio [from eq. (i) and (ii)],

$$\frac{\text{CSA in first case}}{\text{CSA in second case}} = \frac{4\pi\times7\times7}{4\pi\times14\times14}$$

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

Hence, required ratio = 1 : 4

Q5. A hemispherical bowl made of brass has inner diameter 105 cm. Find the cost of tin-plating it on the inside at the rate of Rs. 16 per 100 cm^2.



Ans: Inner diameter of bowl

= 10.5 cm

$\therefore$ Inner radius of bowl $(r) = \frac{10.5}{2}$

= 5.25 cm

Now, Inner surface area of bowl

$= 2\pi r^2$

$= 2\times\frac{22}{7}\times5.25\times5.25$

$= 2\times\frac{22}{7}\times\frac{21}{4}\times\frac{21}{4} = \frac{693}{4}$ cm^2

$\because$ Cost of tin-plating per 100 cm^2

= Rs. 16

$\therefore$ Cost of tin-plating per 1 $cm^2 = \frac{16}{100}$

$\therefore$ Cost of tin-plating per $\frac{693}{4}$ cm^2

$= \frac{16}{100}\times\frac{693}{4}$ = Rs. 27.72

Q6. Find the radius of a sphere whose surface area is 154 cm^2.

Ans: Surface area of sphere = 154 cm^2

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

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

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

$\Rightarrow r^2 = \frac{49}{4}$

$\Rightarrow r = \frac{7}{2} = 3.5$ cm

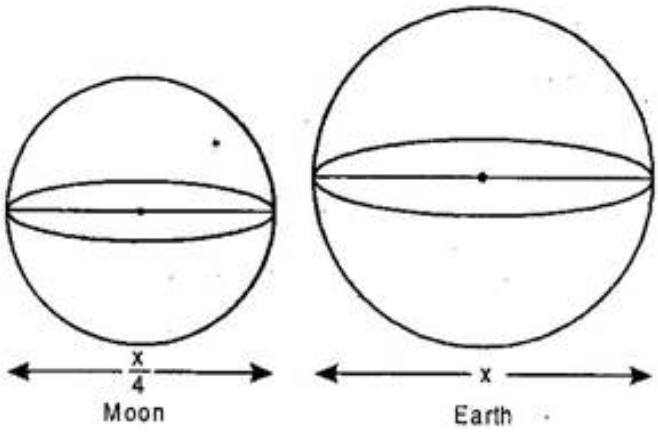
Q7. The diameter of the moon is approximately one fourth the diameter of the earth. Find the ratio of their surface areas.

Ans: Let diameter of Earth = x

$\therefore$ Radius of Earth $(r) = \frac{x}{2}$

$\therefore$ Surface area of Earth = $4\pi r^2$

$= 4\pi\times\frac{x}{2}\times\frac{x}{2} = \pi x^2$



Now, Diameter of Moon = $\frac{1}{4}th$ of diameter of Earth = $\frac{x}{4}$

$\therefore$ Radius of Moon $(r) = \frac{x}{8}$

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

$= 4\pi \times \frac{x}{8} \times \frac{x}{8} = \frac{\pi x^2}{16}$

Now, Ratio = $\frac{\text{Surface area of Moon}}{\text{Surface area of Earth}}$

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

$\therefore$ Required ratio = 1 : 16

Q8. 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: Inner radius of bowl $(r) = 5$ cm

Thickness of steel $(t) = 0.25$ cm

$\therefore$ Outer radius of bowl (R) = $r + t$

$= 5 + 0.25 = 5.25$ cm

$\therefore$ Outer curved surface area of bowl

$= 2\pi R^2 = 2 \times \frac{22}{7} \times 5.25 \times 5.25$

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

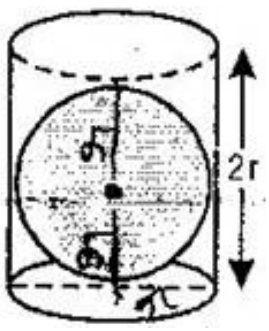
$= \frac{693}{4} = 173.25 \text{ cm}^2$

Q9. 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) Radius of sphere = r

$\therefore$ Surface area of sphere

$= 2\pi(\text{radius})^2 = 2\pi r^2$

$\because$ The cylinder just encloses the sphere in it.

$\therefore$ The height of cylinder will be equal to diameter of sphere.

And The radius of cylinder will be equal to radius of sphere.

(ii) $\therefore$ Curved surface area of cylinder

$= 2\pi rh = 2\pi r \times \pi r \quad [\because h = 2r]$

$= 4\pi r^2$

(iii) $\dfrac{\text{Surface area of sphere}}{\text{Curved surface area of cylinder}}$

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

$\therefore$ Required ratio = 1 :1

********** END **********