Mathematics

(www.tiwariacademy.com)

(Chapter –11) (Surface Areas and Volumes) (Exercise 11.2)

(Class – 9)

Question 1:

Find the surface area of a sphere of radius:

(i) 10.5 cm **(ii)** 5.6 cm **(iii)** 14 cm

Answer 1:

(i) Radius of sphere $r = 10.5$ cm

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

$= 4 \times \frac{22}{7} \times 10.5 \times 10.5 = 4 \times 22 \times 1.5 \times 10.5 = 1386.00 \text{ cm}^2$

Hence, the surface area of sphere is 1386 cm^2.

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

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

$= 4 \times \frac{22}{7} \times 5.6 \times 5.6 = 4 \times 22 \times 0.8 \times 5.6 = 394.24 \text{ cm}^2$

Hence, the surface area of sphere is 394.24 cm^2.

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

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

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

Hence, the surface area of sphere is 2464 cm^2.

Question 2:

Find the surface area of a sphere of diameter:

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

Answer 2:

(i) Radius of sphere $r = 14/2 = 7$ cm

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

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

Hence, the surface area of sphere is 616 cm^2.

(ii) Radius of sphere $r = 21/2 = 10.5$ cm

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

$= 4 \times \frac{22}{7} \times 10.5 \times 10.5 = 4 \times 22 \times 4.5 \times 10.5 = 1386 \text{ cm}^2$

Hence, the surface area of sphere is 1386 cm^2.

(iii) Radius of sphere $r = 3.5/2 = 1.75$ cm

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

$= 4 \times \frac{22}{7} \times 1.75 \times 1.75 = 4 \times 22 \times 0.25 \times 1.75$

$= 38.50 \text{ cm}^2$

Hence, the surface area of sphere is 38.5 cm^2.

Question 3:

Find the total surface area of a hemisphere of radius 10 cm. (Use $\pi = 3.14$)

Answer 3:

Radius of hemisphere $r = 10$ cm

Surface area of hemisphere $= 3\pi r^2$

$= 3 \times 3.14 \times 10 \times 10 = 942 \text{ cm}^2$

Hence, the total surface area of hemisphere is 942 cm^2.

Question 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.

Answer 4:

First Case:

Radius of balloon $r = 7$ cm

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

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

Hence, the surface area of balloon is 616 cm^2.

Second Case:

Radius of balloon $R = 14$ cm

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

$= 4 \times \frac{22}{7} \times 14 \times 14$

$= 4 \times 22 \times 2 \times 14$

$= 2464 \text{ cm}^2$

Hence, the surface area of balloon is 2464 cm^2.

Ratio of surface areas $= \frac{616}{2464} = \frac{1}{4}$

Hence, the ratio of surface areas in two cases is 1: 4.

Question 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 ₹16 per 100 cm^2.

Answer 5:

Internal radius of hemispherical bowl $r = 10.5/2 = 5.25$ cm

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

$= 2 \times \frac{22}{7} \times 5.25 \times 5.25 \; = 2 \times 22 \times 0.75 \times 5.25$

$= 173.25 \text{ cm}^2$

Cost of tin-plating at the rate of ₹16 per 100 cm^2

$= \; ₹\, 173.25 \times \frac{16}{100} = ₹\, 27.72$

Hence, the cost of tin-plating inside at the rate of ₹16 per 100 cm^2 is ₹ 27.72.

Question 6:

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

Answer 6:

Surface area of sphere is 154 cm^2. Let the radius of sphere = r cm

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

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

$\Rightarrow r^2 = \frac{77}{4} \quad \Rightarrow r = \sqrt{\frac{77}{4}} = \frac{7}{2}$

Hence, the radius of sphere is $\frac{7}{2}$ cm.

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

Answer 7:
Let, the radius of Earth $= R$, therefore, the diameter of Earth $= 2R$

According to question, diameter of Moon $= \frac{1}{4}(2R)$, so, the radius of Moon $= \frac{\frac{1}{4}(2R)}{2} = \frac{1}{4}R$

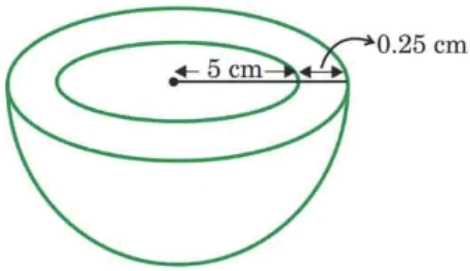
Now,

$$\frac{\text{Surface area of Moon}}{\text{Surface area of Earth}} = \frac{4\pi\left(\frac{1}{4}R\right)^2}{4\pi(R)^2} = \frac{\frac{1}{16}R^2}{R^2} = \frac{1}{16}$$

Hence, the ratio of surface areas of Moon to Earth is 1: 16.

Question 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.

Answer 8:
Internal radius of hemispherical bowl $r = 5$ cm and thickness $= 0.25$ cm
Therefore,
The outer radius of hemispherical bowl
$= R = 5 + 0.25 = 5.25$ cm
Outer curved surface area of hemispherical bowl



$= 2\pi R^2$

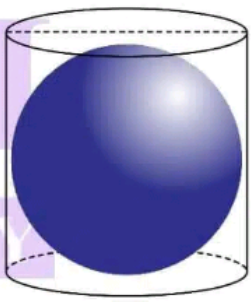
$= 2 \times \frac{22}{7} \times 5.25 \times 5.25$

$= 2 \times 22 \times 0.75 \times 5.25$

$= 173.25 \text{ cm}^2$

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

Question 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).



Answer 9:
(i) Radius of sphere = radius of cylinder = r
Hence, the surface area of sphere = $4\pi r^2$

(ii) Radius of cylinder = r and height h = diameter of sphere = $2r$
Hence, the curved surface area of cylinder = $2\pi rh = 2\pi r(2r) = 4\pi r^2$

(iii) Now,

$$\frac{\text{Surface area of sphere}}{\text{Curved surface area of cylinder}} = \frac{4\pi r^2}{4\pi r^2} = \frac{1}{1}$$

Hence, the ratio of surface area of sphere to curved surface area of cylinder is 1: 1.