Surface Area and Volumes of a Sphere – 21.1

1.

Sol:

(i) Given radius $=10\cdot 5cm$

$\boxed{Surface\ area = 4\pi r^2}$

$= 4\times\frac{22}{7}\times(10\cdot 5)^2$

$=1386\,cm^2$

(ii) Given radius $=5\cdot 6cm$

Surface area $=4\pi r^2 = 4\times\frac{22}{7}\times(5\cdot 6)^2 = 394\cdot 24cm^2$

(iii) Given radius = 14cm

Surface area $=4\pi r^2 = 4\times\frac{22}{7}\times(14)^2 = 2464cm^2$

2.

Sol:

(i) Diameter = 14cm

Radius $=\frac{Diameter}{2} = \frac{14}{2} = 7cm$

$\therefore$ Surface area $=4\pi r^2 = 4\times\frac{22}{7}\times(7)^2 = 616cm^2$

(ii) Diameter = 21cm

Radius $=\frac{Diameter}{2} = \frac{21}{2} = 10\cdot 5cm$

$\therefore$ Surface area $=4\pi r^2 = 4\pi\times(10\cdot 5)^2 = 4\times\frac{22}{7}\times 10\cdot 5^2 = 1386cm^2$

(iii) Diameter = $3\cdot 5cm$

Radius $=3\cdot 5cm/2 = 1\cdot 75cm$

$\therefore$ Surface area $=4\pi r^2 = 4\times\frac{22}{7}\times\frac{3\cdot 5}{2^2} = 38\cdot 5cm^2$

3.

Sol:

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

$= 2 \times 3 \cdot 14 \times (10)^2$

$= 628 cm^2$

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

$= 3 \times 3 \cdot 14 \times (10)^2$

$= 942 cm^2$

4.

Sol:

Surface area of a sphere is $5544 cm^2$

$\Rightarrow 4\pi r^2 = 5544$

$\Rightarrow \frac{4 \times 22}{7} \times r^2 = 5544$

$\Rightarrow r^2 = \frac{5544 \times 7}{88}$

$\Rightarrow r = \sqrt{21cm \times 21cm} = \sqrt{(21)^2} cm$

$\Rightarrow r = 21 cm.$

Diameter $= 2$ (radius)

$= 2(21cm)$

$= 42 cm.$

5.

Sol:

Given

Inner diameter of hemisphere bowl $= 10 \cdot 5 cm$

Radius $= \frac{10 \cdot 5}{2} cm = 5 \cdot 25 cm.$

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

$= 2\left[\frac{22}{7}\right] \times (5 \cdot 25)^2 \ cm^2$

$= 173 \cdot 25 cm^2.$

Cost of tin planning $100 cm^2$ area = Rs 4

Cost of tin planning $173 \cdot 25 cm^2$ area = $Rs\left(\frac{4 \times 173 \cdot 25}{100}\right)$

$= Rs \ 6 \cdot 93$

Thus, The cost of tin plating the inner side of se hemisphere bowl is $Rs\, 6 \cdot 93$

6.

Sol:

Dome Radius $= 63d\ m = 6\cdot 3m$

Inner $S\cdot A$ of dome $= 2\pi r^2 = 2\times\frac{22}{7}\times(6\cdot 3)^2 = 249\cdot 48m^2$

Now, cost of $1m^2 = Rs\ 2.$

$\therefore$ Cost of $249\cdot 48m^2 = Rs[2\times 249\cdot 48]$

$= Rs\ 498\cdot 96.$

7.

Sol:

$\frac{3}{4}^{th}$ of earth surface is covered by water

$\therefore \frac{1}{4}^{th}$ earth surface is covered by c and

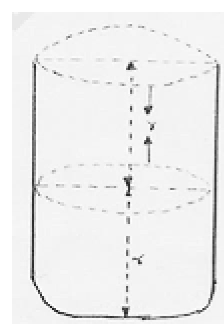
$\therefore$ Surface area covered by land $= \frac{1}{4}\times 4\pi r^2$

$= \frac{1}{4}\times 4\times\frac{22}{7}\times 6370^2$

$= 1275\cdot 27400\,km^2$

8.

Sol:



Given length of the shape $= 7cm$

But length $= r + r$

$\Rightarrow 2r = 7cm$

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

$\Rightarrow r = 3\cdot 5cm$

Also; $h = r$

Total S.A of shape $= 2\pi rh + 2\pi r^2 = 2\pi r^2 = 2\pi r\times r + 2\pi r^2$

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

$= 4\pi r^2$

$= 4\times\frac{22}{7}\times(3\cdot 5)^2$

$= 154cm^2$

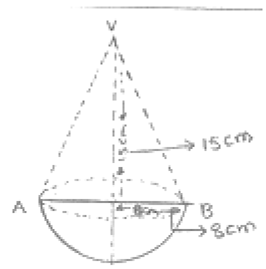
9.

Sol:

Diameter of cone = 16cm.

$\therefore$ Radius of cone = 8cm.

Height of cone = 15cm



Slant height of cone $=\sqrt{8^2+15^2}$

$=\sqrt{64+225}$

$=\sqrt{289}$

$=17cm$

$\therefore$ Total curved surface area of toy

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

$=\frac{22}{7}\times 8\times 17+2\times\frac{22}{7}\times 5^2$

$=\frac{5808}{7}cm^2$

Now, cost of $100cm^2 = Rs\,7$

$1cm^2 = Rs\frac{7}{100}$

Hence, cost of $\frac{5808}{7}cm^2 = Rs\left(\frac{5808}{7}\times\frac{7}{100}\right)$

$=Rs\,58\cdot 08$

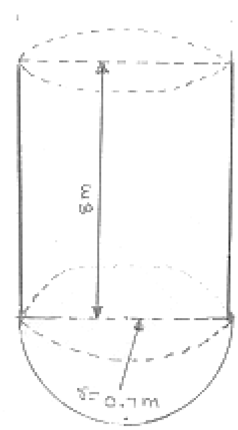
10.

Sol:

Diameter of cylinder $=1\cdot 4m$

$\therefore$ Radius of cylinder $=\frac{1\cdot 4}{2}=0\cdot 7m$

Height of cylinder = 8m.



$\therefore S\cdot A$ of tank $=2\pi rh+2\pi r^2$

$=2\times\frac{22}{7}\times 0\cdot 7\times 8+2\times\frac{22}{7}\times(0\cdot 7)^2$

$=\frac{176}{5}+\frac{77}{25}$

$=\frac{957}{25}=38\cdot 28cm^2$

Now, cost of $1m^2 = Rs$ 10.

$\therefore$ Cost of $38\cdot 28m^2 = Rs[10\times 38\cdot 28]$

$= Rs\ 382 \cdot 80$

11.

Sol:

Let the diameter of the earth is f then, diameter of moon will be $\frac{d}{4}$

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

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

$S \cdot A$ of moon $= 4\pi\left(\frac{d}{8}\right)^2$

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

Required ratio $= \frac{4\pi\left(\frac{d}{8}\right)^2}{4\pi\left(\frac{d}{2}\right)^2} = \frac{4}{64} = \frac{1}{16}$

Thus, the required ratio of the surface areas is $\frac{1}{16}$.

12.

Sol:

Given that only the rounded surface of the dome to be painted, we would need to find the curved surface area of the hemisphere to know the extent of painting that needs to be done.
Now, circumference of the dome $= 17 \cdot 6m.$
Therefore, $17 \cdot 6 = 2\pi r.$

$2 \times \frac{22}{7} r = 17 \cdot 6m.$

So, the radius of the dome $= 17 \cdot 6 \times \frac{7}{2 \times 22} m = 2 \cdot 8m$

The curved surface area of the dome $= 2\pi r^2$

$= 2 \times \frac{22}{7} \times 2 \cdot 8 \times 2 \cdot 8cm^2$

$= 49 \cdot 28m^2$

Now, cost of painting $100cm^2$ is Rs 5.

So, cost of painting $1m^2 = Rs\ 500$

Therefore, cost of painting the whole dome

$= Rs\ 500 \times 49 \cdot 28$

$= Rs\, 24640$

13.

Sol:

Wooden sphere radius $= \left(\frac{21}{2}\right) cm = 10 \cdot 5 cm.$

Surface area of a wooden sphere

$= 4\pi r^2 = 4\left[\frac{22}{7}\right][10 \cdot 5]^2\ cm^2 = 1386 cm^2$

Radius (r^1) of cylindrical support $= 1 \cdot 5 cm$

Height (h^1) of cylindrical support $= 7 cm$

CSA of cylindrical support $= 2\pi r^1 h\left[2 \times \frac{22}{7} \times 1 \cdot 5 \times 7\right]$

$= 66 cm^2$

Area of circular end of cylindrical support $= \pi r^2 \left[\frac{22}{7}(1 \cdot 5)^2\right] = 7 \cdot 07 cm^2$

Area to be painted silver $= \left[8 \times (1386 - 7 \cdot 07)\right] cm^2$

$= 8(1378 \cdot 93) cm^2$

$= 11031 \cdot 44 cm^2$

Cost occurred in painting silver color

$= Rs\ (11031 \cdot 44 \times 0 \cdot 25) = Rs\ 2757 \cdot 86$

Area to painted black $= (8 \times 66) cm^2 = 528\ cm^2$

Cost occurred in painting black color $= Rs(528 \times 0 \cdot 05) = Rs\ 26 \cdot 40$

$\therefore$ Total cost occurred in painting $= Rs(2757 \cdot 86 + 26 \cdot 40) = Rs\, 2789 \cdot 26$