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1. Find the surface area of a sphere of radius:
(i) 10.5cm (ii) 5.6cm (iii) 14cm
(Assume π=22/7)

Solution:

Formula: Surface area of sphere (SA) = $4πr^2$

(i)Radius of sphere, r = 10.5 cm
SA = $4×(22/7)×10.5^2$ = 1386
Surface area of sphere is 1386 cm^2

(ii)Radius of sphere, r = 5.6cm
Using formula, SA = $4×(22/7)×5.6^2$ = 394.24
Surface area of sphere is 394.24 cm^2

(iii)Radius of sphere, r = 14cm
SA = $4πr^2$
    = $4×(22/7)×(14)^2$
    = 2464
Surface area of sphere is 2464 cm^2

2. Find the surface area of a sphere of diameter:
(i) 14cm (ii) 21cm (iii) 3.5cm
(Assume π = 22/7)

Solution:

Radius of sphere, r = diameter/2 = 14/2 cm = 7 cm

Formula for Surface area of sphere = $4πr^2$
= $4×(22/7)×7^2$ = 616
Surface area of a sphere is 616 cm^2

(ii) Radius (r) of sphere = 21/2 = 10.5 cm
Surface area of sphere = $4πr^2$
= $4×(22/7)×10.5^2$ = 1386
Surface area of a sphere is 1386 cm^2
Therefore, the surface area of a sphere having diameter 21cm is 1386 cm^2

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

Surface area of sphere = $4\pi r^2$
$$= 4 \times (22/7) \times 1.75^2 = 38.5$$
Surface area of a sphere is 38.5 cm^2

3. Find the total surface area of a hemisphere of radius 10 cm. [Use π=3.14]
Solution:

Radius of hemisphere, r = 10cm
Formula: Total surface area of hemisphere = $3\pi r^2$
$$= 3 \times 3.14 \times 10^2 = 942$$
The total surface area of given hemisphere is 942 cm^2.

4. The radius of a spherical balloon increases from 7cm to 14cm as air is being pumped into it. Find the ratio of surface areas of the balloon in the two cases.
Solution:

Let r_1 and r_2 be the radii of spherical balloon and spherical balloon when air is pumped into it respectively. So
 r_1 = 7cm
r_2 = 14 cm

Now, Required ratio = (initial surface area)/(Surface area after pumping air into balloon)
= $4\pi r_1^2/4\pi r_2^2$
= $(r_1/r_2)^2$
= $(7/14)^2 = (1/2)^2 = \frac{1}{4}$

Therefore, the ratio between the surface areas is 1:4.

5. A hemispherical bowl made of brass has inner diameter 10.5cm. Find the cost of tin-plating it on the inside at the rate of Rs 16 per 100 cm^2. (Assume π = 22/7)

Solution:

Inner radius of hemispherical bowl, say r = diameter/2 = (10.5)/2 cm = 5.25 cm
Formula for Surface area of hemispherical bowl = $2\pi r^2$
= $2 \times (22/7) \times (5.25)^2 = 173.25$

Surface area of hemispherical bowl is 173.25 cm^2

Cost of tin-plating 100 cm^2 area = Rs 16
Cost of tin-plating 1 cm^2 area = Rs 16 /100
Cost of tin-plating 173.25 cm^2 area = Rs. (16×173.25)/100 = Rs 27.72
Therefore, the cost of tin-plating the inner side of the hemispherical bowl at the rate of Rs 16 per 100 cm^2 is Rs **27.72.**

6. Find the radius of a sphere whose surface area is 154 cm². (Assume π = 22/7)

Solution:
Let the radius of the sphere be r.
Surface area of sphere = 154 (given)
Now,
$4\pi r^2 = 154$
$r^2 = (154 \times 7)/(4 \times 22) = (49/4)$
$r = (7/2) = 3.5$

The radius of the sphere is 3.5 cm.

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

Solution:

If diameter of earth is said d, then the diameter of moon will be d/4 (as per given statement)
Radius of earth = d/2
Radius of moon = ½×d/4 = d/8
Surface area of moon = $4\pi(d/8)^2$
Surface area of earth = $4\pi(d/2)^2$

$$\text{Ratio of their Surface areas} = \frac{4\pi\left(\frac{d}{8}\right)^2}{4\pi\left(\frac{d}{2}\right)^2} = 4/64 = 1/16$$

The ratio between their surface areas is 1:16.

8. A hemispherical bowl is made of steel, 0.25 cm thick. The inner radius of the bowl is 5cm. Find the outer curved surface of the bowl. (Assume π =22/7)
Solution:

Given:
Inner radius of hemispherical bowl = 5cm
Thickness of the bowl = 0.25 cm

Outer radius of hemispherical bowl = (5+0.25) cm = 5.25 cm

Formula for outer CSA of hemispherical bowl = $2\pi r^2$, where r is radius of hemisphere
= $2\times(22/7)\times(5.25)^2 = 173.25$ cm²

Therefore, the outer curved surface area of the bowl is 173.25 cm².

9. A right circular cylinder just encloses a sphere of radius r (see fig. 13.22). Find
(i) surface area of the sphere,
(ii) curved surface area of the cylinder,
(iii) ratio of the areas obtained in(i) and (ii).

Fig. 13.22

Solution:
(i) Surface area of sphere = $4\pi r^2$, where r is the radius of sphere
(ii) Height of cylinder, h = r+r =2r
Radius of cylinder = r
CSA of cylinder formula = $2\pi rh = 2\pi r(2r)$ (using value of h)
= $4\pi r^2$
(iii) Ratio between areas = (Surface area of sphere)/(CSA of Cylinder)
= $4\pi r^2/4\pi r^2 = 1/1$

Ratio of the areas obtained in (i) and (ii) is 1:1.