THE VILLAGE INTERNATIONAL SCHOOL

QUESTION BANK – MATHEMATICS

GRADE: 9 **CHAPTER: SURFACE AREA AND VOLUME**

1. Total surface area of a hemisphere is 4158 cm^2, the diameter of the hemisphere is equal to _____ cm. (Take $\pi = 22/7$)

a) 40 cm b) 20 cm c) 21 cm d) 42 cm

Ans: d) 42 cm

2. If the surface area of a sphere of radius "R" is equal to the curved surface area of a hemisphere of radius "r", what is the ratio of R/r?

a) ½ b) $1/\sqrt{2}$ c) 2 d) $\sqrt{2}$

Ans: $1/\sqrt{2}$

3. If a right circular cone has radius 4 cm and slant height 5 cm then what is its volume?

(a) 16π cm^3 (b) 14π cm^3 (c) 12π cm^3 (d) 18π cm^3

Ans: 16π cm^3

4. Two right circular cones of equal curved surface areas have slant heights in the ratio of 3 : 5. Find the ratio of their radii.

(a) 4 : 1 (b) 3 : 5 (c) 5 : 3 (d) 4 : 5

Ans: 5 : 3

5. Assertion: If the diameter of a sphere is decreased by 25%, then its curved surface area is decreased by 43.75%.

Reason : Curved surface area is increased when diameter decreases

a) both Assertion and reason are correct and reason is correct explanation for Assertion

b) both Assertion and reason are correct but reason is not correct explanation for Assertion

c) Assertion is correct but reason is false

d) both Assertions and reason are false

Ans: c) Assertion is correct but reason is false

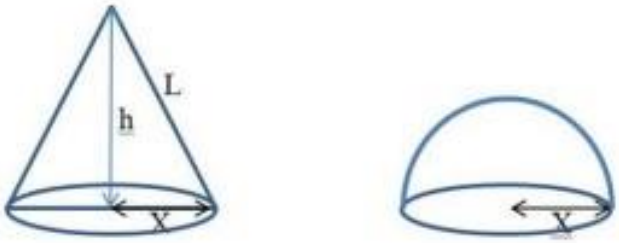
CASE BASED QUESTION:-

6. Sangita had a hemispherical bowl of radius r. She made a conical vessel of radius r with a tin sheet.

(i) find the height of the conical vessel so that it can hold the water same as that of the hemispherical bowl.

(ii) if the radius of the cone formed in the above part is 14 cm, then find how much sheet is used?

(iii) if the height of the conical vessel is doubled, how much more water can it hold than the hemispherical bowl?



Ans: (i) since, volume of conical vessel = volume of hemispherical bowl

$$\Rightarrow \frac{1}{3}\pi r^2 h = \frac{2}{3}\pi r^3$$

$$\Rightarrow \frac{1}{3}\pi r^2 h - \frac{2}{3}\pi r^3 = 0$$

$$\Rightarrow h = 2r$$

The height is 2r

(ii) since, radius = r = 14 cm

Height = 28 cm

$$l^2 = h^2 + r^2$$

$$\Rightarrow l^2 = 28^2 + 14^2$$

$$\Rightarrow l = 14\sqrt{5} \text{ cm}$$

$$\Rightarrow \text{area of sheet required} = \pi r l$$

$$= 1377.41 \ cm^2$$

(iii) $$\frac{\frac{1}{3}\pi r^2 h}{\frac{2}{3}\pi r^3} = 2:1$$

it can hold twice the volume of the hemisphere.

7. How many square metres of canvas is required for a conical tent whose height is3.5 m and the radius of the base is 12 m?

Ans: $l^2 = h^2 + r^2$

$l^2 = 3.5^2 + 12^2$

$\Rightarrow l = 12.25$ m

total canvas required = πrl

$\pi \times 12 \times 12.5 = 471\ m^2$

8. A shopkeeper has one spherical laddoo of radius 5cm. With the same amount of material, how many ladoos of radius 2.5 cm can be made?

Ans: Given, radius of the spherical laddu, r = 5 cm

∴ Volume of a spherical laddu $= \frac{4}{3}\pi r^3 = \frac{4}{3}\pi 5^3 = \frac{500}{3}\pi\ cm^3$

Now, radius of small laddu = 2.5 cm

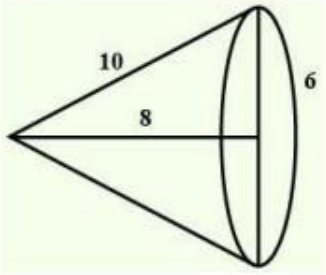
Volume of a small laddu $= \frac{4}{3}\pi r^3 = \frac{4}{3}\pi 2.5^3 = \frac{62.5}{3}\pi\ cm^3$

∴ Number of laddoos $= \frac{Volume\ \ of\ \ a\ sp\ herical\ \ laddu}{Volume\ \ of\ \ a\ small\ \ laddu}$

$= \frac{\frac{500}{3}\pi\ cm^3}{\frac{62.5}{3}\pi\ cm^3} = 8$

So, he can make 8 ladoos.

9. A right triangle with sides 6 cm, 8 cm and 10 cm is revolved about the side 8 cm.Find the volume and the curved surface of the solid so formed.



Ans: When a right triangle with sides 6 cm, 8 cm and 10 cm is revolved about the side 8 cm, then solid formed is a cone whose height, h = 8 cm.

The radius of the cone, r = 6 cm.

Slant height of the cone, l = 10 cm

∴ Volume of the cone = $\frac{1}{3}\pi r^2 h = \frac{1}{3} * \frac{22}{7} * 6^2 * 8$

$= 301.7\ cm^3$

Curved surface area of the cone = πrl

$= \frac{22}{7} * 6 * 10 = 188.5 cm^2$

Hence, the volume and surface area of the cone are 301.7 cm^3 and 188.5 cm^2 respectively.

LONG ANSWER TYPE QUESTIONS

10. A semi-circular sheet of metal of diameter 28 cm is bent to form an open conicalcup. Find the capacity of the cup.

Ans: Circumference of a semicircle = πrWhereas, r is the radius of circle

Diameter of circular sheet =28 cm

∴ Radius of circular sheet = 14 cm

Therefore,

Circumference of circular sheet =14π

When a semi-circular sheet is bent to form an open conical cup, the radius of the sheet becomes the slant height of the cup and the circumference of the sheet becomes the circumference of the base of the cone.

Slant height of cup (l)= Radius of circular sheet =14cm

Circumference of the base of cone = circumference of circular sheet =14π

Let r be the radius of the base of cone

$\therefore 2\pi r = 14 \Rightarrow r = 7cm$

Let h be the height of the cup.

Therefore, $l^2 = h^2 + r^2$

$$14^2 = 7^2 + h^2$$

$$\Rightarrow h = 7\sqrt{2}\ cm$$

Now,Capacity of cup = Volume of cone

As we know that, volume of cone is given as-

$$V = \frac{1}{3}\pi r^2 h$$

Therefore, Capacity of cup $= \frac{1}{3}\pi 7^2 * 7\sqrt{2}$

$$= 622.4cm^3$$

11. Two solid spheres made of the same metal have weights 5920 g and 740 g, respectively.Determine the radius of the larger sphere, if the diameter of the smaller one is 5 cm.

Ans: Mass is directly proportional to volume for same metal (Density)

Let Mass of Solid 1 be M_1, Volume be V_1, Mass of Solid 2 be M_2 and Volume be V_2

$$\frac{M1}{M2} = \frac{V1}{V2}$$

Volume of sphere is directly proportional to R^3

$$\frac{M1}{M2} = \frac{V1}{V2} = \frac{(R1)3}{(R2)3}$$

$$\frac{5920}{740} = \frac{(R1)3}{(R2)3}$$

$$\frac{(R1)3}{(R2)3}=8$$

$$\frac{R1}{R2}=2$$

$R1 = 2 * 2.5 = 5$ cm

12. A corn cob shaped somewhat like a cone, has the radius of its broadest end as 2.1 cm and length (height) as 20 cm. If each 1 cm^2 of the surface of the cob carries an average of four grains, find how many grains you would find on the entire cob.

Ans: We know the curved surface area of cone cob = πrl.

Given, r = 2.1cm , h = 20 cm.

$$l^2 = h^2 + r^2$$

$$l^2 = 2.1^2 + 20^2$$

$$l = 20.11 \text{ cm}$$

∴ Curved surface area of corn cab = $\frac{22}{7} * 2.1 * 20.11 = 132.73 \text{ cm}^2$

Since, the number of grains on 1 cm^2 of the surface corn cob =4,

∴ Number of grain on 132.73 cm^2 of the surface of corn cab =132.73×4=530.92≈531.