RBSE BOARD

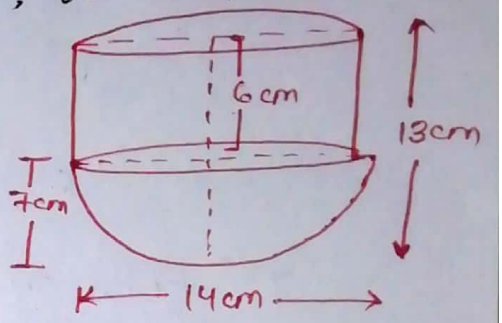
SURFACE AREA AND VOLUME

PREVIOUS YEAR QUESTION [2015-19]

(1) A vessel is in the form of a hollow hemisphere mounted by hollow cylinder. The radius of the hemisphere is 7 cm and the total height of the vessel is 13 cm. Find the inner surface area of the vessel, [PART-B, RBSE-2015]

Sol. Here, height of hemispherical part (r) = 7 cm,

Height of cylindrical part (h) = 13 − 7 = 6 cm



Now, Inner surface area of the vessel

= CSA of cylindrical part + CSA of hemispherical part.

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

$= 2\pi r(h + r)$

$= 2 \times \frac{22}{7} \times 7\,(6 + 7)$

$= 44 \times 13 = 572\ cm^2$.

(2) A copper rod of radius $\frac{1}{2}$ cm and length 2 cm is drawn into the wire of length 18 m of uniform thickness. Find the thickness of the wire. [PART-C, RBSE-2015]

Sol. Given that,

$D = 1$, $r = \frac{1}{2}$ cm

Height of rod (H) = Length of rod = 2 cm

Vol. of rod, $= \pi r^2 h$

$= \pi \times \left(\frac{1}{2}\right)^2 \times 2\ cm^3$

Cylindrical wire of length (h) = 18 m = 1800 cm

∴ Vol. of cylindrical rod = Vol. of cylindrical wire

Let 'r' be the radius of cross-section of the wire

$$\therefore \pi \times \left(\frac{1}{2}\right)^2 \times 2 = \pi r^2 \times 1800$$

$$r^2 = \frac{1}{4} \times 2 \times \frac{1}{1800}$$

$$r = \frac{1}{30} \text{ cm}$$

Thickness of wire $= \frac{1}{30} \times 2 = \frac{1}{15}$ cm.

(3) The total surface area of a solid hemisphere is 462 cm^2. Find its radius. [RBSE-2016, PART-B]

Sol. Given,

Total surface area of hemisphere = 462 cm^2

Let radius be r,

So, $TSA = 3\pi r^2$

$$3\pi r^2 = 462$$

$$3 \times \frac{22}{7} \times r^2 = 462$$

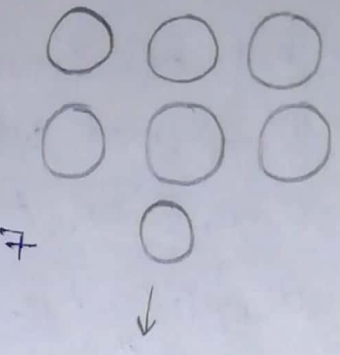
$$r^2 = \frac{462 \times 7}{3 \times 22} = 49$$

$r^2 = 49 \Rightarrow r = 7$ cm.

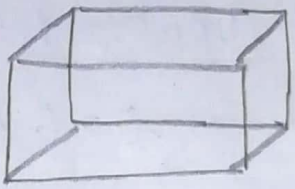
(4) Seven sphere of equal radii are made by melting a silver-cuboid of dimensions 8 cm × 9 cm × 11 cm. Find the radius of silver sphere.

Sol. [RBSE-2016, PART-C]

Sol Consider,



Silver cuboid of volume = Vol. of sphere are equal to 7 radius,



Let

1 sphere of radius r

$$\therefore 8 \times 9 \times 11 = \frac{4}{3} \times \pi \times r^3 \times 7$$

$$\Rightarrow r^3 = \frac{8 \times 9 \times 11 \times 3}{4 \times \pi \times 7} = \frac{33 \times 72 \times 7}{4 \times 7 \times 22}$$

$$r^3 = 27 \Rightarrow r = 3 \text{ cm}$$

Hence, radius of silver sphere = 3 cm.

(5) A vessel is in the form of a hollow hemisphere. The diameter of the hemisphere is 14 cm. Find the inner surface area of the vessel. [RBSE 2017, PART-B]

Sol Simplify the expression,

We know that, CSA $= 2\pi r^2$

Given, $d = 14$ cm

$$r = \frac{14}{2} = 7 \text{ cm}$$

So, $2\pi r^2 = 2 \times \frac{22}{7} \times 7 \times 7$

$= 44 \times 7$

$= 308 \text{ cm}^2$

⑥ A well of diameter 7m and earth from digging is evenly spread out to form a platform 22m × 14m × 2.5m. Find the depth of a well. [RBSE 2017 - PART-C]

Sol. Simplify the expression,

Vol. of platform = Vol. of cylinder

$$l \times b \times h_1 = \pi r^2 h_2$$

Here, $d = 7m \Rightarrow r = \frac{7}{2} m$

$l = 22m$, $b = 14m$, $h_1 = 2.5$

$h_2 = ?$

Putting value,

$$22 \times 14 \times \frac{2.5}{10} = \frac{22}{7} \times \frac{7}{2} \times \frac{7}{2} \times h_2$$

$$h_2 = \frac{22 \times 14 \times 25 \times 7 \times 2 \times 2}{22 \times 7 \times 7 \times 10}$$

$$h = 20m$$

Hence, height of platform is $h = 20m$.

⑦ The total surface area of cube is 216 sq meter. Find the side of cube.

Sol. Simplify the expression,

$$S.A. = 6a^2$$

given, $SA = 216 m^2$

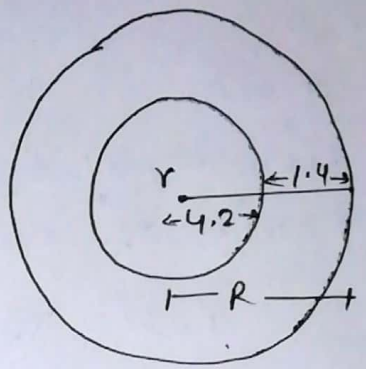
so, $216 = 6a^2 \Rightarrow a^2 = \frac{216}{6} = 36$

$a^2 = 36 \Rightarrow \boxed{a = 6}$

Thus side = 6m.

(8) The radius of a circular park is 4.2 m. A path of 1.4 m width is made around the circular park. Find the area of the path. [RBSE 2018 - PART-C]

Sol. Simplify the expression,



Radius of immaculate = 4.2 m

and width external circular

$= 4.2 + 1.4$

$= 5.6 = R$

Area of path, $\pi(R^2 - r^2)$

$= \frac{22}{7}(R - r)(R + r)$

$= \frac{22}{7}(5.6 + 1.4)(5.6 - 1.4)$

$= \frac{22}{7} \times 7 \times 4.2$

$= 92.4 \text{ cm}^2$.

Hence area of path is 92.4 cm^2. Ans

(9) The weight of cylinder is 21 cm and its curved surface area is 924 cm^2. Find the radius of cylinder.

[RBSE - 2019 - PART-B]

Sol. Simplify the expression,

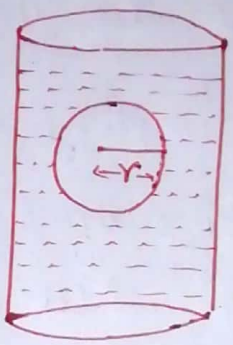
we know that, $SA = 2\pi rh$

Given, $h = 21 \text{ cm}$

So, $924 = 2 \times \frac{22}{7} \times r \times 21$

$r = \frac{924 \times 7}{2 \times 22 \times 21} = 7 \text{ cm}$. Ans

(10) A sphere of 6cm diameter is dropped into cylindrical vessel of diameter 12 cm. Find the rise in water in the vessel.



Sol. Here,

given,

diameter of sphere = 6 cm

Radius of sphere $r = 3$ cm

Radius of cylinder $R = 6$ cm

Let height of water raised by h cm

Then vol. of water thus raised $= \pi R^2 h$

$\therefore$ Vol. of water raised = Vol. of sphere

$= \pi R^2 h = \frac{4}{3} \pi r^3$

$= R^2 h = \frac{4}{3} r^3$

$(6)^2 \times h = \frac{4}{3} \times (3)^3 \Rightarrow h = \frac{4}{3} \times \frac{27}{36}$

$h = 1$ cm

Therefore, water will raised by 1 cm.