DAY 7

1. **A cylindrical bucket 32 cm high and with radius of base 18 cm is filled with sand. This bucket is emptied on the ground and a conical heap of sand is formed. If the height of the conical heap is 24 cm, find the radius and slant height of the heap.**

[Ex 13.3, Q7]

Sol:- Given radius of the cylindrical bucket $(r) = 18cm$, height $(h) = 32\ cm$
and Height of conical heap $(\mathrm{H}) = 24\ cm$ and let R be the radius of heap.

According to given condition: Sand emptied from bucket = Sand in conical heap

$\therefore$ **Volume of the Cylinderical bucket = Volume of the Conical Heap**

$\Rightarrow \quad \pi r^2 h = \frac{1}{3}\pi \mathrm{R}^2 \mathrm{H}$

$\Rightarrow \quad \pi \times 18 \times 18 \times 32 = \pi \times \mathrm{R}^2 \times 24$

$\Rightarrow \quad \mathrm{R}^2 = \frac{18\times18\times32}{24} = 18 \times 18 \times 4 = 18^2 \times 2^2\ cm$

$\Rightarrow \quad \mathrm{R} = 18 \times 2 = 36\ cm$

$\therefore$ Radius of conical heap is **36 *cm***

Now Slant height of conical heap $(l) = \sqrt{\mathrm{R}^2 + \mathrm{H}^2} = \sqrt{36^2 + 24^2} = \sqrt{1296 + 576}$

$= \sqrt{1872} = \sqrt{2 \times 2 \times 2 \times 2 \times 3 \times 3 \times 13} = 2 \times 2 \times 3\sqrt{13} = 12\sqrt{13}\ cm$

$\therefore$ Slant Height of conical heap is **36 *cm***

2. **How many silver coins, 1.75 cm in diameter and of thickness 2 mm, must be melted to form a cuboid of dimensions $5.5\ cm \times 10\ cm \times 3.5\ cm$?** **[Ex 13.3, Q6]**

Sol:- Given Diameter of coin(cylinder) $= 1.75cm$

So radius of the coin $(r) = \frac{1.75}{2} = \frac{175}{200} = \frac{7}{8}cm$,

and Thickness or height $(h) = 2\ mm = \frac{2}{10}cm = \frac{1}{5}cm$

Dimensions of cuboid are $5.5\ cm \times 10\ cm \times 3.5\ cm$

Let n be number of silver coins

According to given condition:

$n \times$ **Volume of the coins = Volume of the Cuboid**

$\Rightarrow \quad n \times \pi r^2 h = 5.5 \times 10 \times 3.5$

$\Rightarrow \quad n \times \frac{22}{7} \times \frac{7}{8} \times \frac{7}{8} \times \frac{1}{5} = 5.5 \times 10 \times 3.5$

$\Rightarrow \quad n = \frac{5.5\times10\times3.5\times7\times8\times8\times5}{22\times7\times7} = 4000$

$\therefore$ Number of silver coins = **4000**

3. **A well of diameter 3 m is dug 14 m deep. The earth taken out of it has been spread evenly all around it in the shape of a circular ring of width 4 m to form an embankment. Find the height of the embankment.** **[Ex 13.3. Q4]**

Sol:- Radius of the well $(r) = \frac{3}{2} = 1.5m$ Depth(height) of the well $(h) = 14\ m$

and width of embankment $= 4\ m$

Since embankment is in the form of cylindrical shell with outer radius $(R) = 4 + 1.5 = 5.5\ m$ and inner radius$(r) = 1.5\ m$**,** Let H be the height of the embankment

According to Question: Earth taken from well has been spread for making embankment.

$\therefore$ **Volume of the earth dug from well = Volume of earth in embankment**

$$\Rightarrow \quad \pi r^2 h = \pi(\mathrm{R}^2 - r^2)\mathrm{H}$$

$$\Rightarrow \quad \pi \times 1.5 \times 1.5 \times 14 = \pi \times (5.5^2 - 1.5^2) \times \mathrm{H}$$

$$\Rightarrow \quad \pi \times 1.5 \times 1.5 \times 14 = \pi \times (5.5 - 1.5)(5.5 + 1.5) \times \mathrm{H}$$

$$\Rightarrow \quad \pi \times 1.5 \times 1.5 \times 14 = \pi \times 4 \times 7 \times \mathrm{H}$$

$$\Rightarrow \quad \mathrm{H} = \frac{1.5\times1.5\times14}{4\times7} = \frac{9}{8} = 1.125m$$

$\therefore$ Height of embankment is $\mathbf{1.125\ m}$

4. A container shaped like a right circular cylinder having diameter 12 cm and height 15 cm is full of ice cream. The ice cream is to be filled into cones of height 12 cm and diameter 6 cm having a hemispherical shape on the top. Find the number of such cones which can be filled with ice cream. **[Ex 13.3, Q5]**

Sol:- Diameter of cylinder $= 12\ cm$ So radius of cylinder $(\mathrm{R}) = 6cm$

and height of cylinder $(\mathrm{H}) = 15\ cm$

Now Given Radius of cone = Radius of hemisphere $(r) = 3cm$

and height of cone $(h) = 12cm$

Let n be the number of ice cream cones

According to given condition:

(Ice Cream in cylindrical container) = n × (icecream in hemispherical cones)

$$\therefore \begin{pmatrix} \textit{Volume of} \\ \textit{icecream cone} \end{pmatrix} = n \times \left[(\textit{Volume of cone}) + \begin{pmatrix} \textit{Volume of hemispherical} \\ \textit{top of the icecream} \end{pmatrix}\right]$$

$$\Rightarrow \quad \pi\mathrm{R}^2\mathrm{H} = n \times \left[\frac{1}{3}\pi r^2 h + \frac{2}{3}\pi r^3\right]$$

$$\Rightarrow \quad \pi\mathrm{R}^2\mathrm{H} = n \times \frac{1}{3}\pi r^2[h + 2r]$$

$$\Rightarrow \quad \pi \times 6 \times 6 \times 15 = n \times \frac{1}{3}\pi \times 3 \times 3[12 + 2 \times 3]$$

$$\Rightarrow \quad \pi \times 6 \times 6 \times 15 = n \times \frac{1}{3}\pi \times 3 \times 3 \times 18$$

$$\Rightarrow \quad n = \frac{6\times6\times15\times3}{3\times3\times18} = 10$$

Hence number of ice cream cones are 10