

CHAPTER 10

Surface Area and Volume

Conversion of solid from one shape to another:

As we know, each and every solid occupied some volume. Let us take a candle in the shape of solid cylinder, melt it and pour whole of the molten wax into another container shaped like a sphere. On cooling, you will obtain a candle in the shape of the sphere. The volume of the new candle will be the same as the volume of the earlier candle. So when we convert one solid shape to another, their volumes remains same, no matter how different the new shape is or what is the number of new shapes formed the given solid. In fact, if we melt a big solid or recast it into some new 'n' number of solids, then the volume of the given solid is the sum of volumes of these 'n' new solids.

Example:

Find the number of coins of 1.5 cm diameter and 0.2 cm thickness to be melted to form a right circular cylinder of height 15 cm and diameter 4.5 cm.

Sol.

Given,

Diameter of coin = 1.5 cm

$$\text{Radius of coin (r)} = \frac{1.5}{2} = 0.75 \text{ cm}$$

Also, thickness (height) of coin (h) = 0.2 cm

$$\text{Volume of a coin} = \pi r^2 h = \left[\frac{22}{7} \times (0.75)^2 \times 0.2 \right] \text{cm}^3$$

Diameter of cylinder = 45 cm

$$\text{Radius of cylinder (r}_1\text{)} = \frac{45}{2} = 2.25 \text{ cm}$$

Height of cylinder (h₁) = 15 cm

$$\text{Volume of cylinder} = \pi r_1^2 h_1 = \left[\frac{22}{7} \times (2.25)^2 \times 15 \right]$$

Since, coins are melted to form a right circular cylinder.

$$\text{Number of coins} = \frac{\text{Volume of cylinder}}{\text{Volume of a coin}}$$

$$\frac{\frac{22}{7} \times (2.25)^2 \times 15}{\frac{22}{7} \times (0.75)^2 \times 0.2}$$

Number of coins = 675

