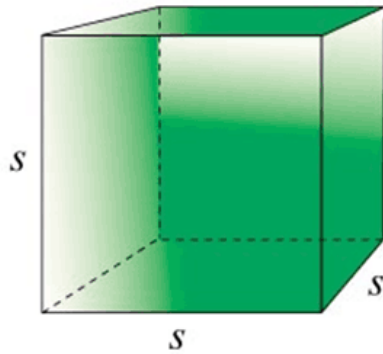


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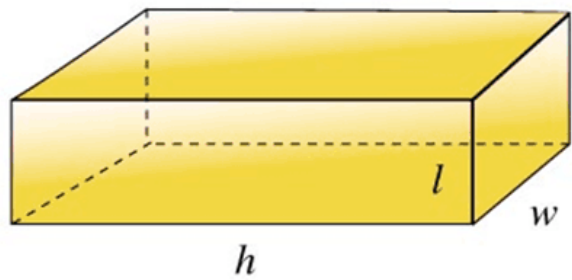
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NCERT Class 9 Solutions: Surface Areas and Volumes (Chapter 13) Exercise 13.6 – Part 3

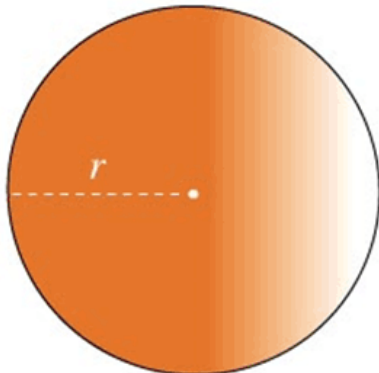
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CUBE

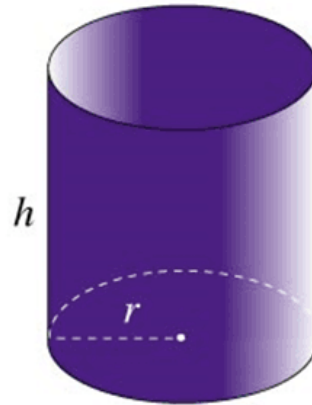
$$V = s^3$$

RECTANGULAR PRISM

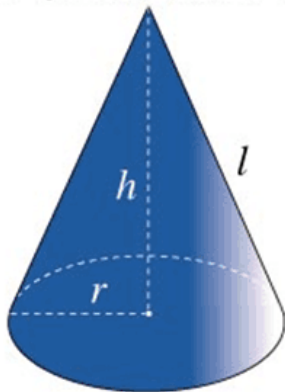
$$V = lwh \text{ or } V = Bh$$

SPHERE

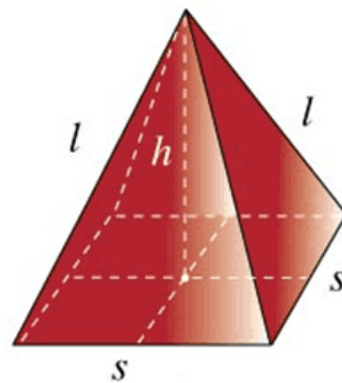
$$V = \frac{4}{3} \pi r^3$$

RIGHT CIRCULAR CYLINDER

$$V = \pi r^2 h$$

RIGHT CIRCULAR CONE

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

RIGHT SQUARE PYRAMID

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

Q-6 The capacity of a closed cylindrical vessel of height 1 m is 15.4 liters. How many square meters of metal sheet would be needed to make it?

Solution:

- Consider the radius of the cylinder to be r
- Height (h) of cylindrical vessel is 1 m
- Since $1\text{ cubic meter} = 1000\text{ liter}$. Therefore, volume of cylindrical vessel $= 15.4\text{ liters} = 0.0154\text{ m}^3$
 - $\Rightarrow \pi r^2 h = 0.0154$

$$\circ \Rightarrow \left(\frac{22}{7} \times r^2 \times 1 \right) m = (0.0154) m^3$$

$$\circ \Rightarrow r^2 = \frac{0.0154 \times 7}{22}$$

$$\circ \Rightarrow r^2 = \frac{0.1078}{22}$$

$$\circ \Rightarrow r^2 = 0.0049$$

$$\circ \Rightarrow r = \sqrt{0.0049}$$

$$\circ \Rightarrow r = 0.07$$

So, the radius of the base of vessel = $0.07m$

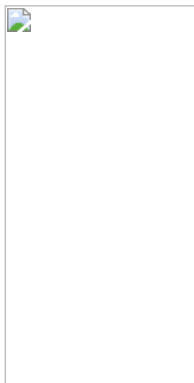
Total surface area of the cylindrical vessel

- $= 2\pi r (h + r)$
- $= 2 \times \frac{22}{7} \times 0.07 (1 + 0.07)$
- $= 2 \times \frac{22}{7} \times 0.07 (1.07)$
- $= \frac{3.2956}{7}$
- $= 0.4708m^2$

So, $0.4708m^2$ of the metal sheet would be required to make the cylindrical vessel.

Q-7 A lead pencil consist of a cylinder of wood with a solid cylinder of graphite filled in the interior. The diameter of the pencil is $7mm$ and the diameter of the graphite is $1mm$. If the length of the pencil is $14cm$, find the volume of the wood and that of the graphite.

Solution:



- Diameter of the graphite cylinder = $1mm = \frac{1}{10}cm$
- Radius = $\frac{1}{20}cm \left(\because \text{radius} = \frac{\text{diameter}}{2} \right)$
- Length of graphite = $14cm$

Volume of the graphite cylinder = $\pi r^2 h$

$$\bullet = \left(\frac{22}{7} \times \frac{1}{20} \times \frac{1}{20} \times 14 \right) cm^3$$

$$\bullet = 0.11 cm^3$$

$$\text{Diameter of the pencil} = 7 mm = \frac{7}{10} cm$$

$$\bullet \text{ Therefore, radius} = \frac{7}{20} cm \left(\because \text{radius} = \frac{\text{diameter}}{2} \right)$$

$$\bullet \text{ Length of pencil} = 14 cm$$

$$\text{Volume of the pencil} = \pi r^2 h$$

$$\bullet \left(\frac{22}{7} \times \frac{7}{20} \times \frac{7}{20} \times 14 \right) cm^3$$

$$\bullet 5.39 cm^2$$

Now pencil has wood and graphite, therefore volume of wood = volume of the pencil - volume of the graphite

$$\bullet (5.39 - 0.11) cm^3$$

$$\bullet 5.28 cm^3$$

Q-8 A patient in a hospital is given soup daily in a cylindrical bowl of diameter $7 cm$. If the bowl is filled with soup to a height of $4 cm$, how much soup the hospital has to prepare daily to serve 250 patients?

Solution:

$$\bullet \text{ Diameter of the cylindrical bowl} = 7 cm$$

$$\bullet \text{ Therefore, radius} = \frac{7}{2} cm \left(\because \text{radius} = \frac{\text{diameter}}{2} \right)$$

$$\bullet \text{ Height of serving bowl} = 4 cm$$

So, soup saved in one serving = volume of the bowl

$$\bullet = \pi r^2 h$$

$$\bullet = \left(\frac{22}{7} \times \frac{7}{2} \times \frac{7}{2} \times 4 \right) cm^3$$

$$\bullet = 154 cm^3$$

Volume of soup given to 250 patients

$$\bullet = (250 \times 154) cm^3$$

$$\bullet = 38500 cm^3$$

$$\bullet = 38.5 \text{ Liters (1 liter = 1000 cubic centimeter)}$$