Mathematics

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(Chapter – 13) (Surface Areas and Volumes)

EXERCISE 13.5

Q.1. *A matchbox measures 4 cm × 2.5 cm × 1.5 cm. What will be the volume of a packet containing 12 such boxes.*

Sol. Here, l = 4 cm, b = 2.5 cm, h = 1.5 cm

Volume of 1 matchbox = lbh

$= 4 \times 2.5 \times 1.5 \text{ cm}^3 = 15 \text{ cm}^3$

Volume of 12 matchboxes = $15 \times 12 \text{ cm}^2$ **= 180 cm^3 Ans.**

Q.2. *A cuboidal water tank is 6 m long, 5 m wide and 4.5 m deep. How many litres of water can it hold?* (1 m^3 = 1000 l)

Sol. Here, l = 6 m, b = 5 m, h = 4.5 m

Volume of the tank = lbh

$= 6 \times 5 \times 4.5 \text{ m}^3 = 135 \text{ m}^3$

$= 135 \times 1000$ litres = 1,35,000 litres.

Hence, the tank can hold 1,35,000 litres of water. **Ans.**

Q.3. *A cuboidal vessel is 10 m long and 8 m wide. How high must it be made to hold 380 cubic metres of a liquid?*

Sol. Here, l = 10 m, b = 8 m, h = ?

Volume of the vessel = lbh

$\Rightarrow$ $380 = 10 \times 8 \times h$

$$\Rightarrow h = \frac{380}{10 \times 8} = 4.75$$

Hence, the tank must be made **4.75 m high Ans.**

Q.4. *Find the cost of digging a cuboidal pit 8 m long, 6 m broad and 3 m deep at the rate of Rs 30 per m^3.*

Sol. l = 8 m, b = 6 m, h = 3 m

Volume of the pit = lbh

$= 8 \times 6 \times 3 \text{ m}^3 = 144 \text{ m}^3$

Cost of digging 1m^3 = Rs 30

$\therefore$ Cost of digging 144 m^3 = Rs 30×144 **= Rs 4320 Ans.**

Q.5. *The capacity of a cuboidal tank is 50000 litres of water. Find the breadth of the tank, if its length and depth are respectively 2.5 m and 10 m.*

Sol. Here, l = 2.5 m, h = 10 m, b = ?

Capacity of the tank = 50000 lites = $\frac{50000}{1000} \text{ m}^3 = 50 \text{ m}^3$

Also, capacity of the tank = lbh

$\Rightarrow 50 = 2.5 \times b \times 10 \quad \Rightarrow b = \frac{50}{25} = 2$

Hence, breadth of the tank **= 2 m Ans.**

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(Class – IX)

Q.6. *A village, having a population of* 4000, *requires* 150 *litres of water per head per day. It has a tank measuring* 20 *m* × 15 *m* × 6 *m. For how many days will the water of this tank last?*

Sol. Here, l = 20 m, b = 15 m, h = 6 m

Population of the village = 4000

Water consumed by 1 person in 1 day = 150 litres

∴ Water consumed by 4000 persons in 1 day = 4000 × 150 litres

$$= \frac{4000 \times 150}{1000} \text{ m}^3 = 600 \text{ m}^3$$

Also, capacity of the tank = lbh

$$= 20 \times 15 \times 6 \text{ m}^3$$

$$\therefore \text{ Required number of days} = \frac{\text{Volume of the tank}}{\text{Water consumed in 1 day}}$$

$$= \frac{20 \text{ x } 15 \text{ x } 6}{600} = 3$$

Hence, the water of this tank will last for 3 days. **Ans.**

Q.7. *A godown measures* 40 *m* × 25 *m* × 10 *m. Find the maximum number of wooden crates each measuring* 1.5 *m* × 1.25 *m* × 0.5 *m that can be stored in the godown.*

Sol. Volume of the godown = 40 × 25 × 10 m^3

Volume 1 wooden crate = 1.5 × 1.25 × 0.5 m^3

$$\therefore \text{ Required number of crates} = \frac{\text{Volume of the godown}}{\text{Volume of 1 crate}}$$

$$= \frac{40 \text{ x } 25 \text{ x } 10}{1.5 \text{ x } 1.25 \text{ x } 0.5} = 10666.67$$

Hence, the maximum number of wooden crates that can be stored in the godown **= 10666 Ans.**

Q.8. *A solid cube of side* 12 *cm is cut into eight cubes of equal volume. What will be the side of the new cube? Also, find the ratio between their surface areas.*

Sol. Here, a = 12 cm

Volume of the cube = a^3 = $(12)^3$ cm^3 = 1728 cm^3

Now, volume of 1 smaller cube = $\frac{1728}{8}$ cm^3 = 216 cm^3

Let side of the new cube be A.

Then A^3 = 216

$\Rightarrow$ $A = \sqrt[3]{216} = 6$

Hence, side of the new cube **= 6 cm Ans.**

Total surface area of the bigger cube = 6 a^2

= 6 × $(12)^2$ cm^2 = 6 × 12 × 12 cm^2

Total surface area of 1 smaller cube = 6A^2

= 6 × 6^2 cm^2 = 6 × 6 × 6 cm^2

Hence, required ratio = $\frac{6 \text{ x } 12 \text{ x } 12}{6 \text{ x } 6 \text{ x } 6} = \frac{4}{1}$ = 4 : 1 **Ans.**

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Q.9. *A river 3 m deep and 40 m wide is flowing at the rate of 2 km per hour. How much water will fall into the sea in a minute?*

Sol. Here, $b = 40$ m, $h = 3$ m, $l = 2$ km $= 2000$ m

Volume of water flowing through the river in 1 hour

$= lbh = 2000 \times 40 \times 3$ m^3

$\therefore$ Volume of water flowing through the river in 1 minute

$$= \frac{2000 \times 40 \times 3}{60} \text{ m}^3 = \mathbf{4000\ m^3\ Ans.}$$