Exercise 13.5

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

Sol: Length = 4cm

Breadth = 2.5cm

Height = 1.5cm

Volume of 1 box = $l \times b \times h$

$= 4 \times 2.5 \times 1.5$

$= 10 \times 1.5$

$= 15\ cm^3$

Volume of 12 boxes = 15×12

$= 180 cm^3$ Ans

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

Sol :-

Length of cuboidal tank = 5m

Breadth of cuboidal tank = 5m

height of cuboidal tank = 4.5m

Volume of cuboidal tank = $l \times b \times h$

$= 5 \times 5 \times 4.5$

$= 135 m^3$

$1m^3 = 1000l$

$= 135 \times 1000$

$= \underline{135000 l}$ Ans

Sum 13.5 : A Cuboidal Vessel is 10m long and 8m wide. How high must it be made to hold 380 cubic metres of a liquid?

Sol : Length of Cuboidal Vessel = 10m

breadth of Cuboidal Vessel = 8m

Let height of Cuboidal vessel = h

Volume of Cuboidal Vessel = $380 m^3$

$l \times b \times h = 380 m^3$

$10m \times 8m \times h = 380 m^3$

$h = \frac{19 \cancel{380}}{10 \times \cancel{8}_{4}} = \frac{19}{4} m$

$h = \underline{4.75 m}$ Ans

Illustration 13.5 : Find the cost of digging a cuboidal pit 8 m long, 6 m broad and 3 m deep at the rate of ₹ 30 per m^3.

Sol :-

Length = 8 m
Breadth = 6 m
Height = 3 m

Volume of Cuboid = length × Breadth × Height

$= 8 \times 6 \times 3$

$= 144\ m^3$

Cost of digging a cuboidal pit of $1\ m^3$ = Rs 30

Cost of digging a cuboidal pit of $144\ m^3$ = Rs 30×144

= Rs 4320. Ans

Sum :- 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 :

Length of Cuboidal tank = 2.5 m
Height of Cuboidal tank = 10 m
Breadth of Cuboidal tank = ?

Capacity of Cuboidal tank = length × Breadth × height

50000 litres = 2.5 m × Breadth × 10 m

$\frac{50000}{1000}$ m^3 = $\frac{25}{10}$ m × 10 m × Breadth

$\frac{2\ 50}{2\ 5}$ m = Breadth

2 m = Breadth. Ans.

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

$1\,m^3 = 1000\,l$

Sol

Population of village = 4000

1 day Consumption per head = 150 litres

1 day Consumption by village = 4000 × 150 litres

$= 600{,}000\,l$

$= \frac{600000}{1000}\,m^3$

$600\,m^3$

Required no. of days × water Consumption by village by 1 day = Volume of tank

Required no. of days × $600\,m^3$ = $l \times b \times h$

Required no. of days × $600\,m^3$ = $20m \times 15m \times 6m$

Required no. of days $= \frac{20 \times 15 \times 6}{600}$

$\frac{100}{5}$

Required no. of days = 3 days

7 Sum: A Godown measures 40m × 25m × 15m. Find the maximum number of wooden Crates each measuring 1.5m × 1.25m × 0.5m that Can be Stored in the Godown.

Sol:

Godown	Crates
$L = 40m$	$l = 1.5m$
$B = 25m$	$b = 1.25m$
$H = 15m$	$h = 0.5m$

Volume of Godown = N × volume of Crates

$L \times B \times H = N \times l \times b \times h$

$40 \times 25 \times 15 = N \times 1.5 \times 1.25 \times 0.5$

$40 \times 25 \times 15 = N \times \frac{15}{10} \times \frac{125}{100} \times \frac{5}{10}$

$8\ 40 \times \cancel{25}^{5} \times \cancel{15} \times \frac{10}{\cancel{15}} \times \frac{100}{\cancel{125}_{\cancel{25}_{5}}} \times \frac{\cancel{10}^{2}}{\cancel{5}} = N$

$16000 = N$ Ans

16000 Crates Can be Stored in the Godown.

Example 46. 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: Side of bigger cube (A) = 12 cm

volume of bigger cube = $(\text{Side})^3 = (A)^3$

$= (12)^3$

$= 12 \times 12 \times 12$

$= 1728 \text{ cm}^3$

A solid cube is cut into eight cubes of equal volume.

volume of smaller cube $= \frac{1728}{8} \text{ cm}^3$ (216)

$a^3 = 216 \text{ cm}^3$

$a = \sqrt[3]{216 \text{ cm}^3}$

$= \sqrt[3]{6 \times 6 \times 6}$

$a = 6 \text{ cm}$

$\frac{\text{Surface area of bigger cube}}{\text{Surface area of small cube}} = \text{Ratio}$

$\frac{6A^2}{6a^2} = \text{Ratio}$

$\frac{(12)^2}{(6)^2} = \text{Ratio}$

$\frac{12 \times 12}{6 \times 6} = \text{Ratio}$

$4 : 1 = \text{Ratio}$ Ans

9 Sums: A River 3m deep and 40m wide is flowing at the rate of 2Km per hour. How much water will fall into the Sea in a minute?

Sol:

height = 3m

breadth = 40m

Speed = 2 Km/h

$= \frac{2000}{60}$ m/minute

$= \frac{100}{3}$ m/minute.

Length $= \frac{100}{3}$ m/minute.

Volume of Cuboid = lbh

$= \frac{100}{3} \times 40 \times 3$

$= 4000\ m^3$

$4000\ m^3$ will fall into the Sea in a minute.