

EXERCISE 21.2**PAGE NO: 21.15**

1. Find the volume in cubic metres (cu. m) of each of the cuboids whose dimensions are:

(i) length = 12 m, breadth = 10 m, height = 4.5 m

(ii) length = 4 m, breadth = 2.5m, height = 50 cm

(iii) length = 10m, breadth = 25 dm, height = 25 cm.

Solution:

(i) Given details are,

Length of a cuboid = 12 m

Breadth of a cuboid = 10m

Height of a cuboid = 4.5 m

By using the formula

$$\begin{aligned}\text{Volume of cuboid} &= l \times b \times h \\ &= 12 \times 10 \times 4.5 \\ &= 540 \text{ m}^3\end{aligned}$$

(ii) Given details are,

Length of a cuboid = 4 m

Breadth of a cuboid = 2.5 m

Height of a cuboid = 50 cm = 0.50m

By using the formula

$$\begin{aligned}\text{Volume of a cuboid} &= l \times b \times h \\ &= 4 \times 2.5 \times 0.50 \\ &= 5 \text{ m}^3\end{aligned}$$

(iii) Given details are,

Length of a cuboid = 10m

Breadth of a cuboid = 25 dm = 2.5 m

Height of a cuboid = 25 cm = 0.25 m

By using the formula

$$\begin{aligned}\text{Volume of a cuboid} &= l \times b \times h \\ &= 10 \times 2.5 \times 0.25 \\ &= 6.25 \text{ m}^3\end{aligned}$$

2. Find the volume in cubic decimetre of each of the cubes whose side is

(i) 1.5 m

(ii) 75cm

(iii) 2 dm 5 cm

Solution:

(i) Given details are,

Side of cube = 1.5m = 15 dm

So, Volume of cube = $15^3 = 3375 \text{ dm}^3$

(ii) Given details are,

Side of cube = 75cm = 7.5 dm

So, Volume of cube = $7.5^3 = 421.875 \text{ dm}^3$

(iii) Given details are,

Side of cube = 2dm 5cm = 2.5 dm

So, Volume of cube = $2.5^3 = 15.625 \text{ dm}^3$

3. How much clay is dug out in digging a well measuring 3 m by 2 m by 5 m?**Solution:**

Given details are,

Dimensions of well = $3\text{m} \times 2\text{m} \times 5\text{m}$

So,

Volume of clay dug out from well is = $l \times b \times h$
= $3 \times 2 \times 5$
= 30 m^3

4. What will be the height of a cuboid of volume 168 m^3 , if the area of its base is 28 m^2 ?**Solution:**

Given details are,

Volume of a cuboid = 168 m^3

Area of base = $l \times b = 28\text{m}^2$

Let height of cuboid be 'h' m

We know that,

Volume = $l \times b \times h$

$h = \text{volume} / l \times b$

$$= 168/28$$

$$= 6\text{m}$$

\therefore Height of cuboid is 6 m

5. A tank is 8 m long, 6 m broad and 2 m high. How much water can it contain?**Solution:**

Given details are,

Dimensions of a tank = $8\text{m} \times 6\text{m} \times 2\text{m}$

We know that,

$$\begin{aligned}\text{Volume of tank} &= l \times b \times h \\ &= 8 \times 6 \times 2 \\ &= 96 \text{ m}^3 \\ &= 96000 \text{ litres}\end{aligned}$$

\therefore The tank can contain 96000 litres of water.

6. The capacity of a certain cuboidal tank is 50000 litres of water. Find the breadth of the tank, if its height and length are 10 m and 2.5 m respectively.

Solution:

Given details are,

Capacity (volume) of cuboidal tank is = 50000 litre = 50 m^3

Height of tank = 10 m

Length of tank = 2.5 m

Let breadth of tank be 'b' m

We know that,

$$\text{Volume} = l \times b \times h$$

$$b = \text{volume} / (l \times h)$$

$$= 50 / (10 \times 2.5)$$

$$= 2\text{m}$$

\therefore Breadth of tank is 2m

7. A rectangular diesel tanker is 2m long, 2m wide and 40cm deep. How many litres of diesel can it hold?

Solution:

Given details are,

Length of a tanker = 2m

Breadth of a tanker = 2m

Height of a tanker = 40cm = 0.4m

So, Dimensions of rectangular diesel tank = $2\text{m} \times 2\text{m} \times 0.4\text{m}$

$$\begin{aligned}\text{Volume of tank (amount of diesel it can hold)} &= l \times b \times h \\ &= 2 \times 2 \times 0.4 \\ &= 1.6\text{m}^3 \\ &= 1600 \text{ litres}\end{aligned}$$

\therefore A rectangular diesel tanker can hold 1600 litres of diesel.

8. The length, breadth and height of a room are 5 m, 4.5 m and 3 m respectively. Find the volume of the air it contains.

Solution:

Given details are,

Length of a room = 5m

Breadth of a room = 4.5m

Height of a room = 3m

So, Dimensions of a room are = $5\text{m} \times 4.5\text{m} \times 3\text{m}$

$$\begin{aligned}\text{Volume of air} &= l \times b \times h \\ &= 5 \times 4.5 \times 3 \\ &= 67.5\text{m}^3\end{aligned}$$

∴ The room contains 67.5m^3 volume of the air.

9. A water tank is 3 m long, 2 m broad and 1 m deep. How many litres of water can it hold?

Solution:

Given details are,

Length of water tank = 3m

Breadth of water tank = 2m

Height of water tank = 1m

So, Dimensions of water tank is = $3\text{m} \times 2\text{m} \times 1\text{m}$

$$\begin{aligned}\text{Volume the water tank can hold} &= l \times b \times h \\ &= 3 \times 2 \times 1 \\ &= 6\text{m}^3 \\ &= 6000 \text{ litres}\end{aligned}$$

∴ The water tank can hold 6000 litres of water.

10. How many planks each of which is 3 m long, 15 cm broad and 5 cm thick can be prepared from a wooden block 6 m long, 75 cm broad and 45 cm thick?

Solution:

Given details are,

Dimensions of one plank = $3\text{m} \times 15\text{cm} \times 5\text{cm} = 300\text{cm} \times 15\text{cm} \times 5\text{cm}$

Dimensions of wooden block = $6\text{m} \times 75\text{cm} \times 45\text{cm} = 600\text{cm} \times 75\text{cm} \times 45\text{cm}$

We know that,

$$\begin{aligned}\text{Number of planks that can be prepared} &= \text{volume of wooden block} / \text{volume of one plank} \\ &= (600 \times 75 \times 45) / (300 \times 15 \times 5) \\ &= 90 \text{ planks}\end{aligned}$$

∴ 90 planks are required to prepare the block.

11. How many bricks each of size 25 cm × 10 cm × 8 cm will be required to build a wall 5 m long, 3 m high and 16 cm thick, assuming that the volume of sand and

cement used in the construction is negligible?

Solution:

Given details are,

Size of one brick = $25\text{cm} \times 10\text{cm} \times 8\text{cm}$

Dimensions of wall = $5\text{m} \times 3\text{m} \times 16\text{cm} = 500\text{ cm} \times 300\text{ cm} \times 16\text{cm}$

We know that,

$$\begin{aligned}\text{Number of bricks required to build a wall} &= \text{volume of wall} / \text{volume of one brick} \\ &= (500 \times 300 \times 16) / (25 \times 10 \times 8) \\ &= 1200 \text{ bricks}\end{aligned}$$

\therefore 1200 bricks are required to build the wall.

12. A village, having a population of 4000, required 150 litres water per head per day. It has a tank which is 20 m long, 15 m broad and 6 m high. For how many days will the water of this tank last?

Solution:

Given details are,

Population of village = 4000

Dimensions of water tank = $20\text{m} \times 15\text{m} \times 6\text{m}$

Water required per head per day = 150 litres

Total requirement of water per day = $150 \times 4000 = 600000$ litres

$$\begin{aligned}\text{Volume of water tank} &= l \times b \times h \\ &= 20 \times 15 \times 6 \\ &= 1800\text{m}^3 \\ &= 1800000 \text{ litres}\end{aligned}$$

We know that,

$$\begin{aligned}\text{Number of days water last in the tank} &= \text{volume of tank} / \text{total requirement} \\ &= 1800000 / 600000 \\ &= 3 \text{ days}\end{aligned}$$

\therefore Water in the tank last for 3 days.

13. A rectangular field is 70 m long and 60 m broad. A well of dimensions 14 m \times 8 m \times 6 m is dug outside the field and the earth dug-out from this well is spread evenly on the field. How much will the earth level rise?

Solution:

Given details are,

Dimensions of rectangular field = $70\text{m} \times 60\text{m}$

Dimensions of well = $14\text{m} \times 8\text{m} \times 6\text{m}$

$$\begin{aligned}\text{Amount of earth dug out from well (volume)} &= l \times b \times h \\ &= 14 \times 8 \times 6 = 672\text{m}^3\end{aligned}$$

We know that,

$$\begin{aligned}\text{Rise in earth level} &= \text{dimensions of rectangular field} / \text{amount of earth dug up} \\ &= (70 \times 60) / 672 \\ &= 0.16\text{m} \\ &= 16\text{cm}\end{aligned}$$

∴ Rise in earth level on a rectangular field is 16cm.

14. A swimming pool is 250 m long and 130 m wide. 3250 cubic metres of water is pumped into it. Find the rise in the level of water.

Solution:

Given details are,

$$\text{Dimensions of swimming pool} = 250 \text{ m} \times 130\text{m}$$

$$\text{Volume of water pumped in it} = 3250 \text{ m}^3$$

We know that,

$$\begin{aligned}\text{Rise in water level in pool} &= \text{volume of water pumped} / \text{dimensions of swimming pool} \\ &= 3250 / (250 \times 130) \\ &= 0.1\text{m}\end{aligned}$$

∴ Rise in level of water is 0.1m

15. A beam 5 m long and 40 cm wide contains 0.6 cubic metre of wood. How thick is the beam?

Solution:

Given details are,

$$\text{Length of beam} = 5 \text{ m}$$

$$\text{Width of beam} = 40 \text{ cm} = 0.4 \text{ m}$$

$$\text{Volume of wood in beam} = 0.6 \text{ m}^3$$

Let thickness of beam be 'h' m

We know that,

$$\text{Volume} = l \times b \times h$$

$$h = \text{volume} / (l \times b)$$

$$= 0.6 / (5 \times 0.4)$$

$$= 0.3\text{m}$$

∴ Thickness of the beam is 0.3m

16. The rainfall on a certain day was 6 cm. How many litres of water fell on 3 hectares of field on that day?

Solution:

Given details are,

$$\text{Area of field} = 3 \text{ hectare} = 3 \times 10000 \text{ m}^2 = 30000 \text{ m}^2$$

Depth of water on the field = 6cm = $6/100 = 0.06$ m

Volume of water = area of field \times depth of water
 $= 30000 \times 0.06$
 $= 1800 \text{ m}^3$

We know that $1\text{m}^3 = 1000$ litre

So, $1800 \text{ m}^3 = 1800 \times 1000$
 $= 18 \times 10^5$ litre

$\therefore 18 \times 10^5$ litres of water fell on 3hectares of field.

17. An 8 m long cuboidal beam of wood when sliced produces four thousand 1 cm cubes and there is no wastage of wood in this process. If one edge of the beam is 0.5 m, find the third edge.

Solution:

Given details are,

Length of cuboidal beam = 8m

One edge of beam = 0.5m

Let the third edge of beam be 'h' m

Number of cubes of side 1cm (.01 m) produced = 4000

We know that,

Volume of beam = volume of each cube \times no. of cubes

$$8 \times 0.5 \times h = 4000 \times (0.01)^3$$

$$h = 0.004/4$$

$$= 0.001\text{m}$$

\therefore Length of third edge is 0.001 m

18. The dimensions of a metal block are 2.25 m by 1.5 m by 27 cm. It is melted and recast into cubes, each of the side 45 cm. How many cubes are formed?

Solution:

Given details are,

Dimensions of metal block = $2.25\text{m} \times 1.5\text{m} \times 27\text{cm} = 2.25\text{m} \times 1.5\text{m} \times 0.27\text{m}$

Side of each cube formed = 45cm = 0.45 m

We know that,

Number of cubes can formed = volume of metal block / volume of one cube

$$= (2.25 \times 1.5 \times 0.27) / (0.45 \times 0.45 \times 0.45)$$

$$= 0.91125 / 0.091125$$

$$= 10 \text{ cubes}$$

\therefore 10 cubes are formed.

19. A solid rectangular piece of iron measures 6 m by 6 cm by 2 cm. Find the weight

of this piece, if 1 cm^3 of iron weighs 8 gm.

Solution:

Given details are,

Dimensions of solid rectangular piece = $6\text{m} \times 6\text{cm} \times 2\text{cm}$

Volume of rectangular iron = $600\text{cm} \times 6\text{cm} \times 2\text{cm} = 7200\text{cm}^3$

Weight of 1cm^3 iron = 8 gm.

$$\begin{aligned}\text{So, weight of } 7200\text{cm}^3 &= 7200 \times 8 \\ &= 57600 \text{ gm.} \\ &= 57.6 \text{ kg}\end{aligned}$$

\therefore The weight of the piece is 57.6 kg

20. Fill in the blanks in each of the following so as to make the statement true :

(i) $1 \text{ m}^3 = \dots\dots\dots \text{cm}^3$

(ii) 1 litre = $\dots\dots\dots$ cubic decimetre

(iii) 1 kl = $\dots\dots\dots \text{m}^3$

(iv) The volume of a cube of side 8 cm is $\dots\dots\dots$

(v) The volume of a wooden cuboid of length 10 cm and breadth 8 cm is 4000 cm^3 .

The height of the cuboid is $\dots\dots\dots$ cm.

(vi) 1 cu. dm = $\dots\dots\dots$ cu. mm

(vii) 1 cu. km = $\dots\dots\dots$ cu. m

(viii) 1 litre = $\dots\dots\dots$ cu. cm

(ix) 1 ml = $\dots\dots\dots$ cu. cm

(x) 1 kl = $\dots\dots\dots$ cu. dm = $\dots\dots\dots$ cu. cm.

Solution:

(i) $1 \text{ m}^3 = 1 \times (100 \times 100 \times 100) = \underline{10^6 \text{cm}^3}$ (since $1\text{m} = 100\text{cm}$)

(ii) $1 \text{ litre} = 1000\text{cm}^3 = 1000 \times (0.1 \times 0.1 \times 0.1) \text{ dm}^3 = \underline{1\text{dm}^3}$ (since $1\text{cm} = 0.1\text{dm}$)

(iii) $1 \text{ kl} = 1000 \text{ litre} = \underline{1\text{m}^3}$ (since $1\text{m}^3 = 1000 \text{ litre}$)

(iv) The volume of a cube of side 8 cm is $\dots\dots\dots$

We know that, side of a cube = 8cm

So, volume of cube = $8^3 = \underline{512\text{cm}^3}$

(v) The volume of a wooden cuboid of length 10 cm and breadth 8 cm is 4000 cm^3 . The height of the cuboid is $\dots\dots\dots$ cm.

Given, volume of cuboid = 4000 cm^3

Length of cuboid = 10cm

Breadth of cuboid = 8cm

We know that volume = $l \times b \times h$

$$\begin{aligned}h &= \text{volume} / (l \times b) \\ &= 4000 / (10 \times 8) \\ &= \underline{\underline{50\text{cm}}}\end{aligned}$$

$$\begin{aligned}\text{(vi)} \quad 1 \text{ cu. dm} &= 1\text{dm}^3 = 1 \times (10 \times 10 \times 10) = 10^3\text{cm}^3 \text{ (since } 1\text{dm} = 10\text{cm)} \\ &10^3 \times (10 \times 10 \times 10) = \underline{\underline{10^6 \text{mm}^3}} \text{ (since } 1\text{cm} = 10\text{mm)}\end{aligned}$$

$$\text{(vii)} \quad 1 \text{ cu. km} = 1000 \times 1000 \times 1000 = \underline{\underline{10^9\text{m}^3}} \text{ (since } 1\text{km} = 1000\text{m)}$$

$$\text{(viii)} \quad 1 \text{ litre} = 1000 \text{ cm}^3 = \underline{\underline{10^3\text{cm}^3}}$$

$$\text{(ix)} \quad 1 \text{ ml} = 1/1000 \text{ litre} = 1/1000 \times 1000 = \underline{\underline{1\text{cm}^3}} \text{ (since } 1\text{ml} = 1/1000 \text{ litre)}$$

$$\begin{aligned}\text{(x)} \quad 1 \text{ kl} &= 1 \times 1000 \text{ litre} = 1\text{m}^3 = 1 \times (10 \times 10 \times 10) \text{ dm}^3 \text{ (since } 1\text{m} = 10\text{dm)} \\ 1 \text{ kl} &= \underline{\underline{1000 \text{ dm}^3}} = 10^3 \text{ dm}^3 = 1000 \times 1000 = \underline{\underline{10^6 \text{cm}^3}}\end{aligned}$$