LESSON-11

MEASUREMENT OF VOLUME AND WEIGHT

H8W6Q2

On Saturday Jitu finds his school bag rather light and thin. During the other school days of the week, he feels his bag heavier and bulky too. His sister Ragini thought if her books also can be put in his bag. She tried but it does not work.

The bag has some fixed capacity to hold in.

Ragini said – "Your bag will contain at most two books as big as a dictionary. Is not it, brother?"

Jitu – "Yes, you are right. A dictionary is larger in volume".

Ragini – "Volume means?"

Jitu – "The place occupied by a solid object is called its **volume**."

Ragini – "Is it true that every thing such as air, water, stone has its volume?"

Jitu : "Certainly yes Ragini ! Wait I show you some objects before hand."

Look at this bottle of liquid medicine. How much medicine is there in it?

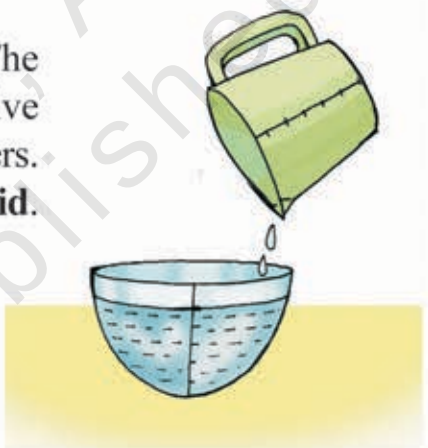
Now look at that water-tank.

What is written on its body.? It means the tank can contain that much water.

— These are examples of volume. Volume means Volume of liquids. Basic Units of volume of liquide are millilitre (ml), litre (L or l) We read on the body of each of the items its volume –

(i)	On milk packet	500 ml
(ii)	On medicine bottle	50 ml
(iii)	On nail polish bottle	5 ml
(iv)	Water-Tank	500 l

Jitu (to Ragini) – One more thing to notice at. The certain volume of a liquid remains same irrespective of the size of the containar or number of the containers. This is called the **conservation of volume of a liquid**.



Let us understand

Relation between litre and millilitre

Padum has a bottle full of water. The bottle contains one litre of water. He has a water gun, on which it is written 200 ml. It can draw 200 ml of water at a time. Padum pumps in, uses the water gun 5 times to empty the bottle. The bottle accumulates 5 × 200 ml = 1000 ml of water. Padum discovers the relation :

1000 ml = 1 litre.

Also 'milli' means one thosandth part

So, he concludes.

$1\ l = 1000$ ml in 1 ml $= \frac{1}{1000}\ l$

Let us learn and do

Convert litre to millilitre

Example (i) *4* litres to millilitres

1 litre = 1000 millitres

4 litre = (4 × 1000) millitres

= 4000 millitres

Example (ii) *6 l 250 ml to ml*

$6\ l\ \ 250\ ml = (6 \times 1000)\ ml + 250\ ml$

$= 6000\ ml + 250\ ml$

$= 6250\ ml$

Example (iii) *3.085 l to ml*

$3.085\ l = 3\ ml + 0.085\ ml$

$= 3 \times 1000\ ml + (0.085 \times 1000)\ ml$

$= 3000\ ml + 85\ ml$

$= 3085\ ml$

Now in opposite way,

Convert millitres to litre

Example (i) *6530 millilitre to litre*

$$6530\ ml = \left(6530 \times \frac{1}{1000}\right) ml \quad [\because\ 1\ ml = \frac{1}{1000}\ ml]$$

$$= \frac{6530}{1000}\ l$$

$$= \frac{653}{100}\ l$$

$$= 6.53\ l$$

Example (ii) ***65 millilitre to litre***

$$1 \text{ millilitre} = \frac{1}{1000} \text{ litre}$$

$$\therefore \quad 65 \text{ millilitre} = \frac{65}{1000}$$

$$= 0.065 \text{ litre}$$

Example (iii) 8 *litre* 500 *millilitre to litre*

$$8\ l\ 500\ ml = 8\ l + 500\ ml$$

$$= 8\ l + \frac{500}{1000}\ ml$$

$$= 8\ l + 0.5\ l$$

$$= 8.5\ l$$

$$\begin{array}{r} 8.0 \\ +\ 0.5 \\ \hline 8.5 \end{array}$$

Try yourself

Convert the following units as directed

(a) 7 litre to *millilitre*

(b) 8 *litre* 250 *millilitre* to *millilitre*

(c) 5.0125 *l* to *ml*

(d) 5620 *ml* to *l*

(e) 55 *ml* to *l*

Now, let us understand some problems from our daily life

Example (i) From three milk-vendors Parag bought 18 *l* 750 ml; 14 *l* 250 ml and 23 *l* 500 ml of milk. What is the total quantity of milk bought by Parag ?

Solve

$$18\ l\ 750\ ml = 18.750\ l$$

$$14\ l\ 250\ ml = 14.250\ l$$

$$3\ l\ 500\ ml = 23.500\ l$$

$$\text{Total} = 56.500\ l$$

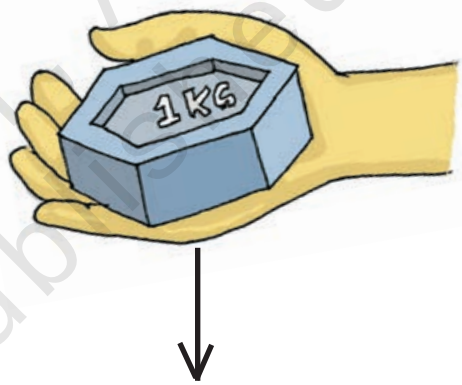
$\therefore$ Total amount of milk bought by Parag is 56 *l and* 500 *ml.*

Try yourself to solve to following

1. A water tank has a capacity of 3000 *l* . The tank is filled with 1536 *l of water*. How much of water is required to fill up the tank?
2. Three bottles of different capacity contain 1 *l*, 500 *ml* and 250 *ml* of mustard oil. If all the bottles are poured into a big sized bottle, what will be the volume of the oil now?
3. In a day, a milk vendor sells 20 *l* of milk to a hotel and 2 litres of milk each to 5 families . How much milk (in litres) does he sell that day?

Weight

You are given a ballon and a piece of weigh
Can you compare them by saying which is heavier or lighter between the two?
You take the weight on your palm. What do you feel? It is pushing your hand downwards. This pulling towards earth may be termed as weight of the object.



We can say that mass is the amount of matter in a body.

We notice the units of weights used in measuring the following objects

(i)	Unit of weight of gold	mg/g
(ii)	Unit of a (medicine) tablet/pil	mg
(iii)	Weight of a human	kg
(iv)	Weight of a goods truck	Quintal

We learn

1000 mg	= 1 gram
1000 g	= 1 kilogram
100 kilogram	= 1 Quintal

Conversion of units

Example *(i) 9 kilogram to gram*

$$1 \text{ kg} = 1000 \text{ gram}$$
$$\therefore \quad 9 \text{ kg} = (9 \times 1000) \text{ gram}$$
$$= 9000 \text{ gram}$$

Example *(ii) 6 kg 325 gram to gram*

$$6 \text{ kg } 325 \text{ gram} = 6 \text{ kg} + 325 \text{ gram}$$
$$= (6 \times 1000) \text{ gram} + 325 \text{ gram}$$
$$= 6000 \text{ gram} + 325 \text{ gram}$$
$$= 6325 \text{ gram}$$

Example *(iii) 30 gram 50 milligram to milligram*

$$30 \textit{ gram } 50 \textit{ milligram} = 30 \textit{ gram} + 50 \textit{ milligram}$$
$$= (30 \times 1000) \textit{ mg} + 50 \textit{ mg}$$
$$= 30000 \textit{ mg} + 50 \textit{ mg}$$
$$= 30050 \textit{ mg}$$

Example *(iv) 5432 gram to kilogram*

$$5432 \textit{ gram} = \left(5432 \times \frac{1}{1000}\right) \textit{kilogram} \quad [1gm = \frac{1}{1000} \textit{ kg}]$$
$$= \frac{5432}{1000} \textit{ kilogram}$$
$$= 5.432 \textit{ kilogram}$$

Example *(v) 6580 milligram to gram*

$$6580 \textit{ milligram} = \left(6580 \times \frac{1}{1000}\right) \textit{gram} \quad [1 \textit{ mg} = \frac{1}{1000} \textit{ g}]$$
$$= \frac{6580}{1000} \textit{ gram}$$
$$= 6.580 \textit{ gram}$$
$$= 6.58 \textit{ gram}$$

Convert the following units as directed

(i) 5 kilograms to gram

(ii) 7 kilograms 250 grams to gram

(iii) 40 gram 30 milligrams to milligrams

(iv) 9899 milligrams to grams

Solve the following (make a pair)

1. Ramen went to the market and he bought 5kg rice, 2kg dal and 1 kg sugar. Express the total weight of the items in gram.

2. In a weighing bridge, the weight of a mini truck is found to be 2950kg. Express the weight of the mini truck in quintal.

3. While suffering from fever, doctor pescribed Mayuri to consume Paracetamol 500mg tablet three times a day. If doctor asked Mayuri to continue the medicine for three days, then, how many grams of Paracetamol tablet did Mayuri consume after three days?

Mark that -Though we are using the word *weight* in measuring objects, actually we measure the mass of the object.(You will learn about it in the higher class)

Volume of solids

You are quite familiar with Ludo. Observe the dice of Ludo. It has length, breadth and height all of equal measure. It is a CUBE. We take some dices of Ludo and build the following formations.

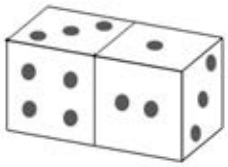
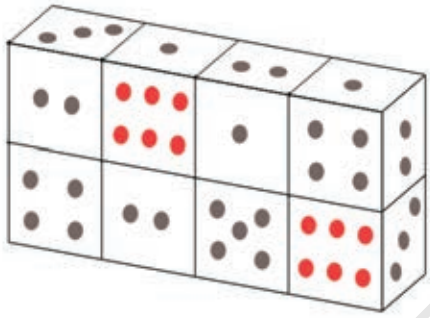
fig-1 

fig-2 

fig-3 

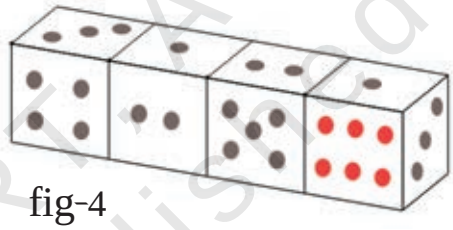


fig-4

Every formation occupies certain space. The amount of space occupied by the formation is the volume of the formation considered. In the above formations-

Which one has biggest volume? fig no. ☐

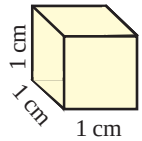
Which one has smallest volume? fig no. ☐

Which two formations have identical volumes? fig no. ☐ and ☐

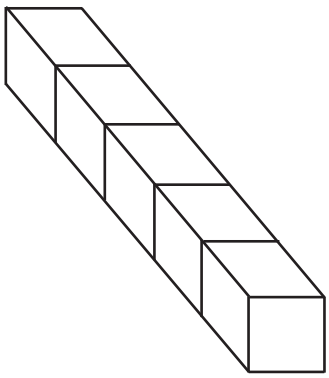
Activities : Collect some pieces of Ludo dices or similar cubes build space formations and compare their volumes (bigger/smaller)

Let us understand how do we find the volume of a cube in general.

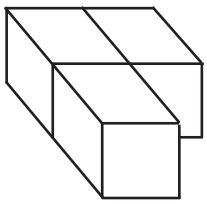
A picture of a cube is given. Notice, as height, length and breadth all are equal, and each in 1 cm. The space occupied by this cube is called one cubic centimetre (cc).



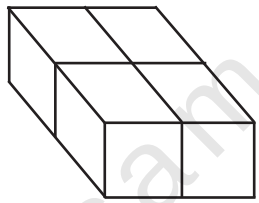
Notice the volumes of the following formations.



5 cc

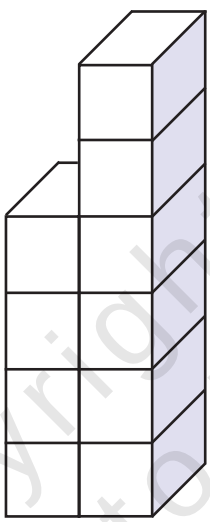


3 cc

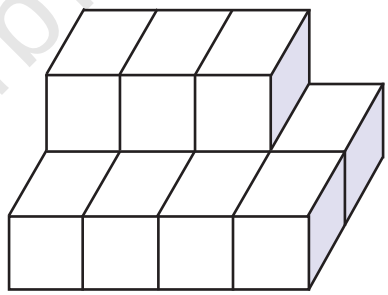


4 cc

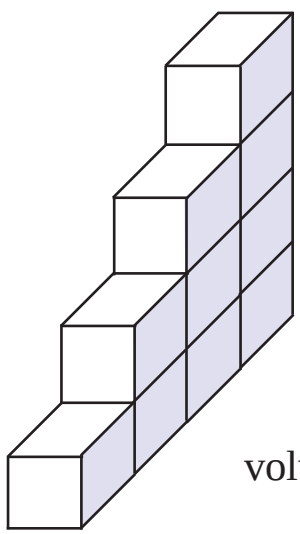
Find out the volumes of the following figures and write in the given place.



volume

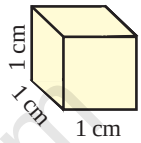


volume



volume

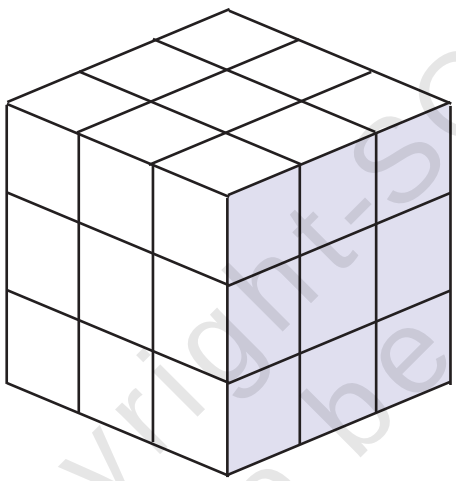
♦ How much (pure) water will a cube with sides one cm occupy?
Let us know
A cube of side 1 cm each can contain 1 ml of water(or liquid)

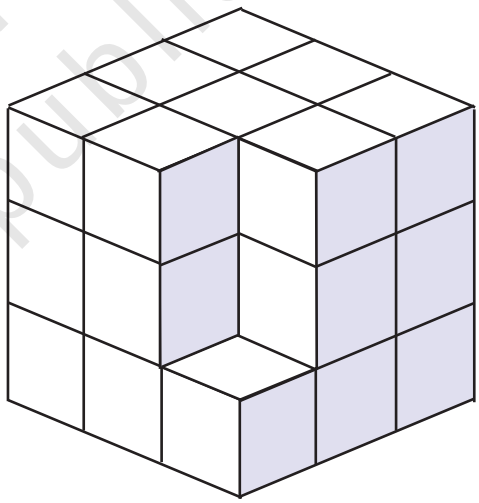


1 cubic cm = 1 ml

Similarly 2 cubic centimeter = 2 ml
3 cubic centimeter = 3 ml
Again, **1000 cubic centimeter = 1000 ml = 1 litre**

The following formations are made of cubes of sides 1 cm. Calculate their volumes.



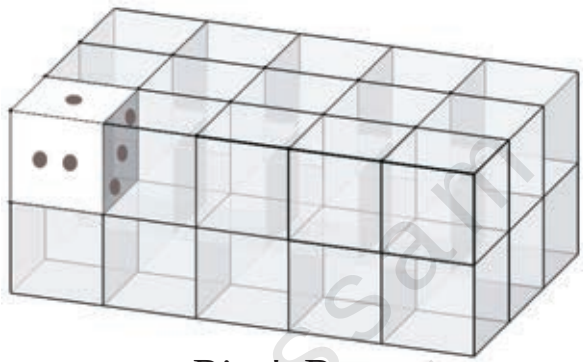


Volume = cubic cm
= ml

Volume = cubic cm
= ml

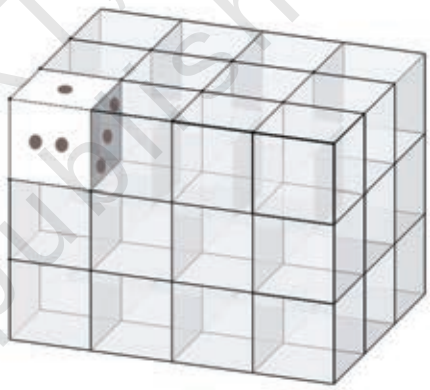
Let us estimate/guess

a. Rina collected some cubes of side 1 cm.each. She put them all in a box shaped as shown in the figure. Now guess : how many cubes the box will occupy ?



Rina's Box

b. Mofida too collected a paper box of the type shown along. Then she puts ludo dice one after another, till the box is filled up. Guess the number of dice in this box.



Mofida's Box

c. Volume of Rina's box and Volume of Mofida's box

d. Whose box has larger volume ?

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