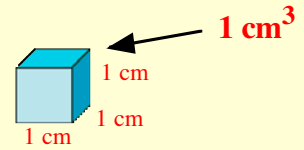


Volumes by Counting Cubes

The volume of a shape is the “**amount of space**” it occupies.

One unit of volume is the **cubic centimetre**.

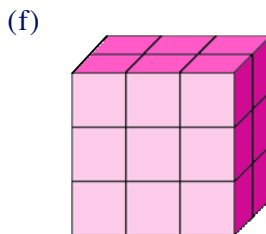
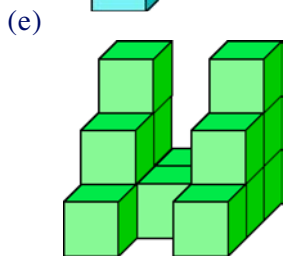
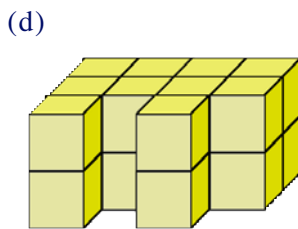
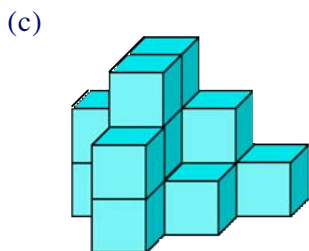
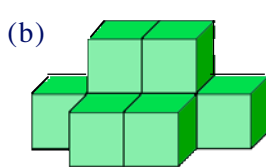
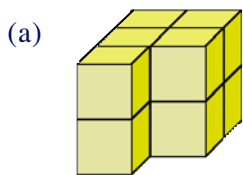
A cube which measures 1 cm by 1 cm by 1 cm and is written as **1 cm³**.



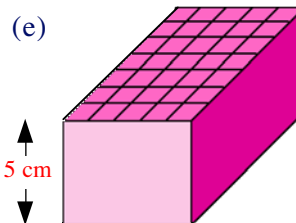
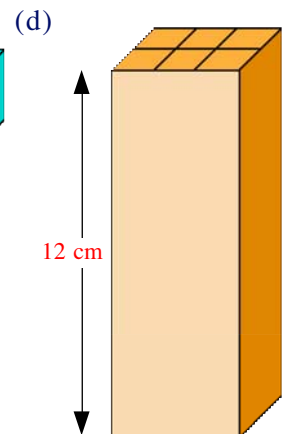
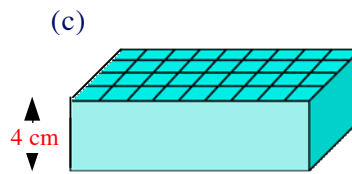
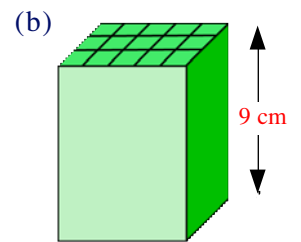
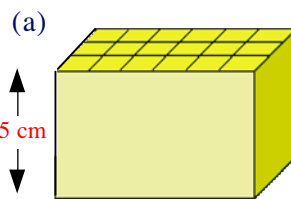
Exercise 16.1

1. Each shape is made from 1 centimetre cubes.

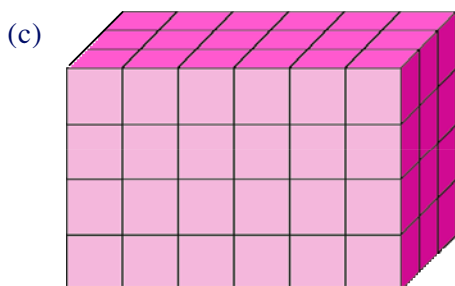
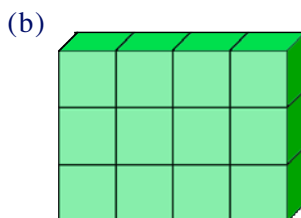
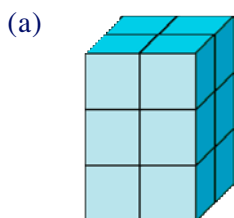
Write each volume in cm³ :-



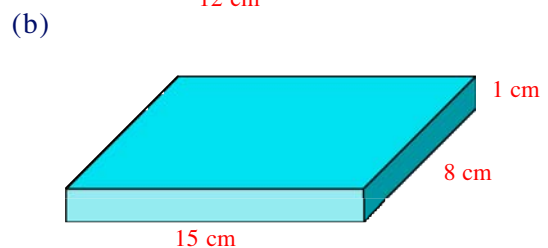
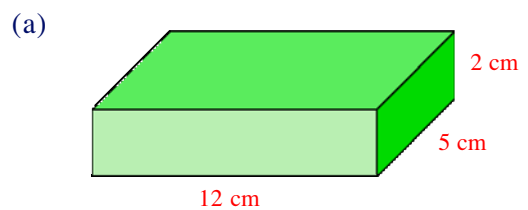
3. Calculate the volume of each shape below :-



2. By working out the volume of the **top layer**, calculate the **total volume** of each shape :-



4. Calculate the volume of each cuboid below :-

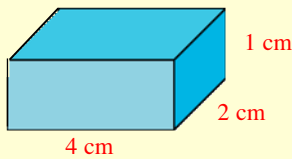


Formula for the Volume of a Cuboid

To find the **volume** of a cuboid, you multiply the **length** \times **breadth** \times **height**.

Formula :- $\text{Volume} = L \times B \times H$

Example :- Find the volume of the cuboid shown.

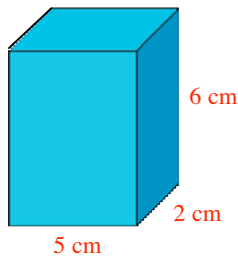


$$\begin{aligned} \text{Volume} &= L \times B \times H \\ &= 4 \times 2 \times 1 \\ &= 8 \text{ cm}^3 \end{aligned}$$

Exercise 16.2

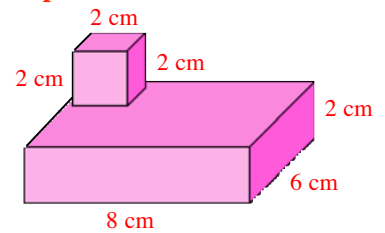
1. **Copy** and complete to find the **volume** of this cuboid :-

$$\begin{aligned} \text{Volume} &= L \times \dots \times \dots \\ &= 5 \times \dots \times \dots \\ &= \dots \text{ cm}^3. \end{aligned}$$

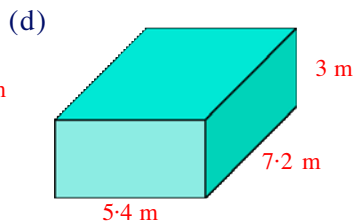
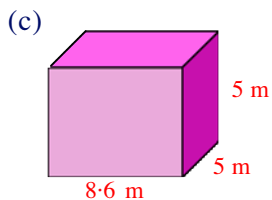
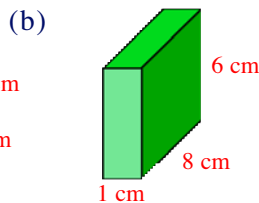
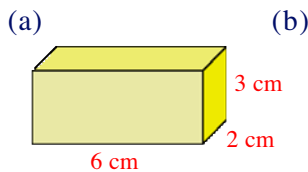


5. A shape made from two or more shapes is called a **composite shape**.

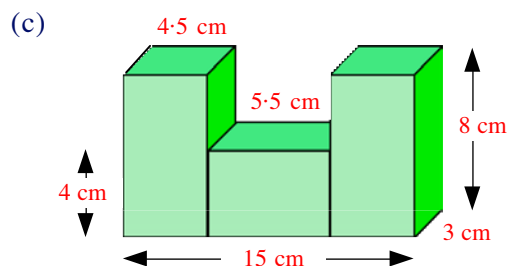
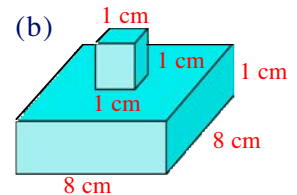
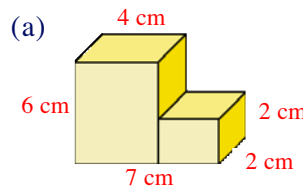
Find the volume of each cuboid **and** then find the **total composite volume**.



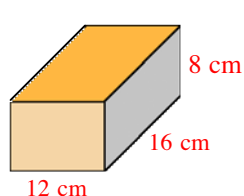
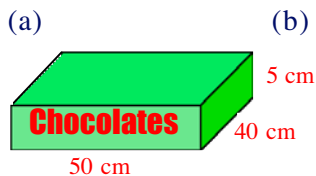
2. Find the **volume** of each cuboid below :-



6. Calculate the **volume** of each composite shape below :-



3. Calculate the volume of each box :-

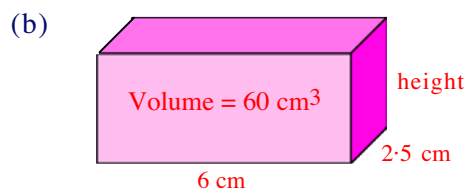
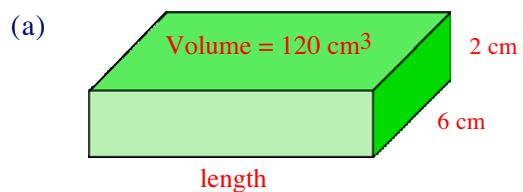


4. **Five** TeeJay books are stacked on top of each other and the pile measures **30 cm** long by **21 cm** wide by **7.5 cm** high.



Find the **volume** of a stack with only **four** books.

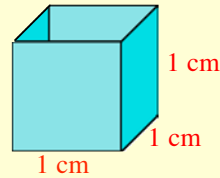
7. Find the missing dimension for each shape :-



Liquid Volume (Capacity)

If you take an open-top cube **1 cm** by **1 cm** by **1 cm** and fill it with water, we say it holds **1 millilitre** of water.

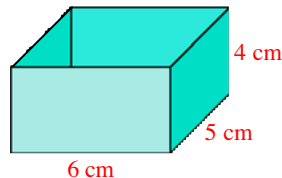
$$1 \text{ cm}^3 = 1 \text{ ml}$$



$$\begin{aligned} \text{Volume} &= 1 \text{ cm}^3 \\ &= 1 \text{ ml} \end{aligned}$$

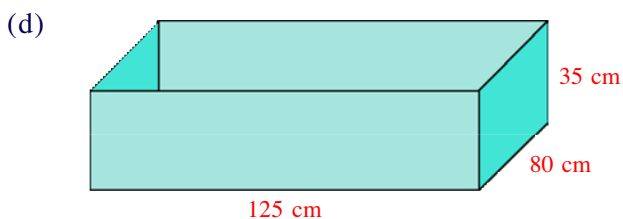
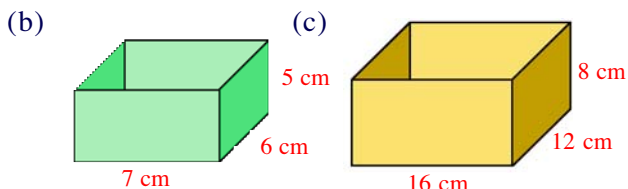
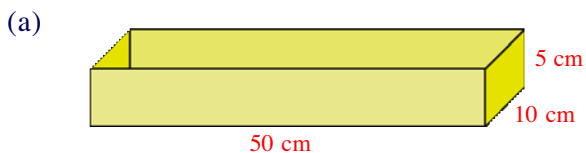
Exercise 16.3

1. (a) Calculate the volume of this cuboidal container, in cm^3 .

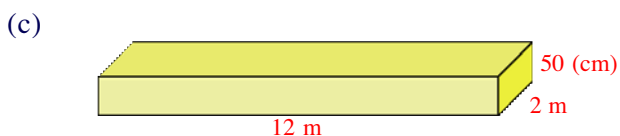
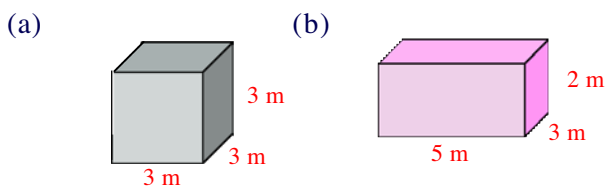


- (b) How many **millilitres** of liquid will it hold ?

2. How many **millilitres** of liquid will each of the following containers hold ?



3. Volume can also be measured in cubic metres. Calculate the **volume** of each of these shapes in m^3 .



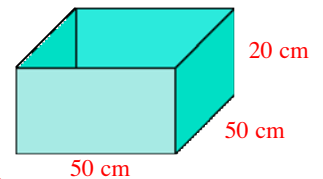
Remember :- to change from **millilitres** to **litres** divide by **1000**

4. Change each of the following to litres :-

- (a) 4000 ml (b) 8000 ml (c) 10000 ml
(d) 8700 ml (e) 400 ml (f) 54200 ml

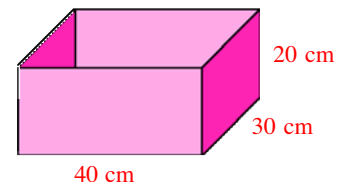
Remember :- $1000 \text{ cm}^3 = 1000 \text{ ml} = 1 \text{ litre}$

5. (a) Calculate the **capacity** of this cuboidal container in **millilitres**.

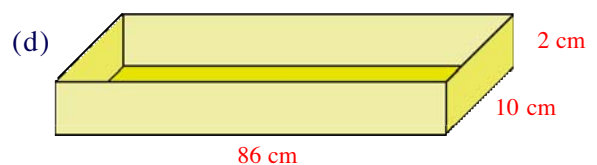
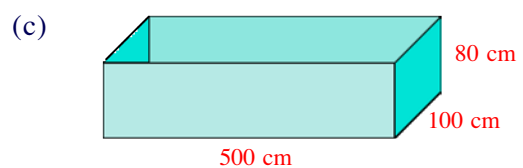
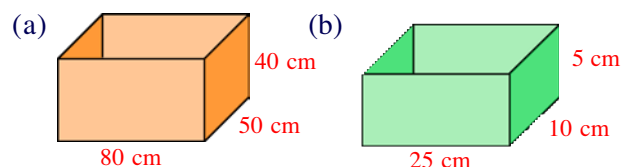


- (b) How many **litres** of liquid will it hold ?

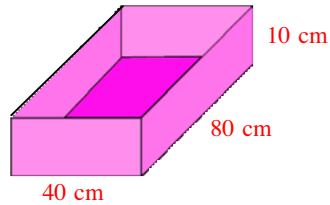
6. Calculate how many **litres** this container holds.



7. How many litres will each of the following containers hold ?



8. How many litres of water will this container hold when :-



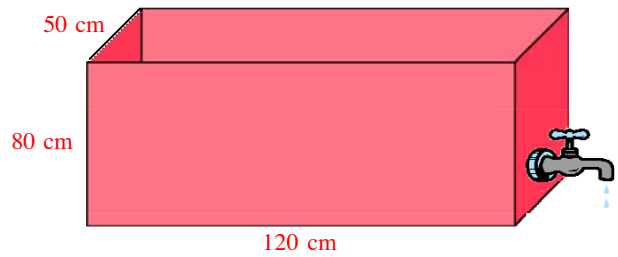
- (a) full
(b) half full
(c) 30% full ?

9. A cuboidal glass aquarium has a length of 50 centimetres and breadth of 40 centimetres.

If 30 litres of water are poured into the aquarium it will be **half full**.

Calculate the **height** of the aquarium.

10. A small 2 litre jug is used to fill the tank below.



- (a) How many full jugs are needed to fill the tank ?

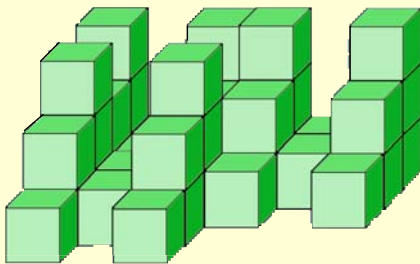
When the tank is full, the tap is opened and water pours out at 3 litres every 30 seconds.

- (b) How many minutes will it take for the tank to empty ?

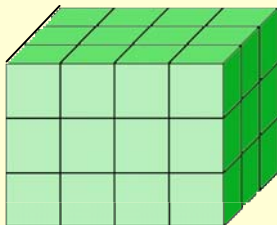
What Have I Learned ?

1. Write the volume of each shape in **cm³** :-

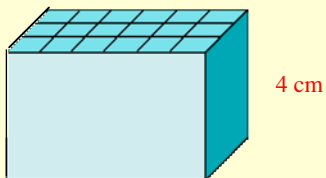
(a)



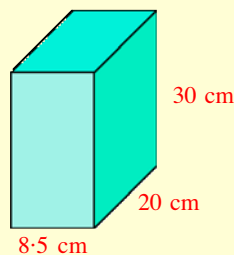
(b)



(c)

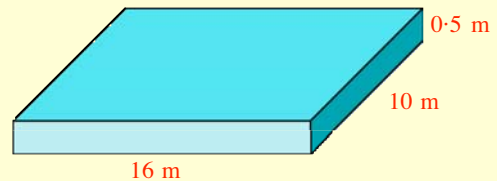


2. Use the **formula** to calculate the volume of the cuboid shown.

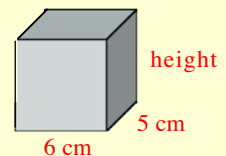


3. Find the volume of a **cube** with side 5 cm.

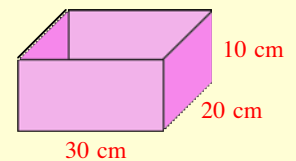
4. Calculate the volume of the cuboid below.



5. This cuboid has a volume of **120 cm³**. Calculate the height.

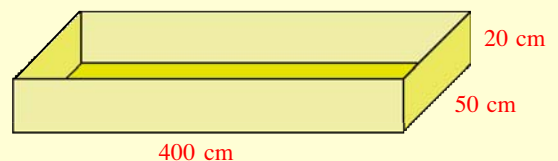


6. (a) Calculate the volume of this cuboid in **cm³**.



- (b) Write down its **capacity in millilitres**.

7. How many **litres** of water would it take to fill the cuboid below ?



8. (**Hard**) 100 litres of water are poured into an open-topped cube of side 50 centimetres. Find the depth of water in the cube.