



Many things are made in the shape of a cuboid, such as drink cartons and cereal boxes. This activity is about finding the volumes of cuboids.

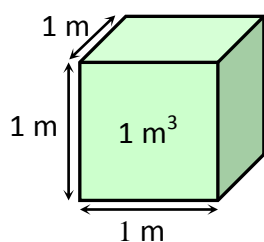


## Information sheet

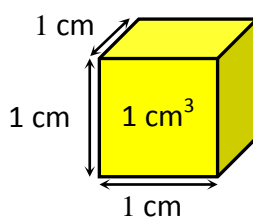
The **volume** of an object is the **amount of space** it fills.

Large volumes are measured in **cubic metres** ( $\text{m}^3$ ).

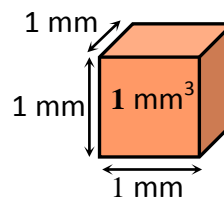
Smaller volumes are measured in **cubic centimetres** ( $\text{cm}^3$ ) or **cubic millimetres** ( $\text{mm}^3$ ).



1 cubic metre



1 cubic centimetre

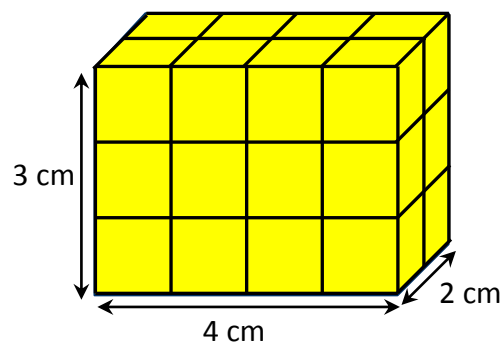


1 cubic millimetre

In this cuboid there are 3 layers of cubes.  
There are 2 rows of 4 cubes in each layer.

The total number of cubes =  $4 \times 2 \times 3$

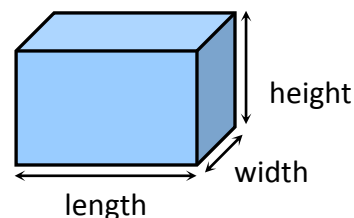
The volume of the cuboid =  $4 \times 2 \times 3 = 24 \text{ cm}^3$



For any cuboid:

Volume = length  $\times$  width  $\times$  height

or Volume = area of cross-section  $\times$  length



The volume of liquids is usually measured in **litres** or **millilitres**.

1 litre = 1000 ml and 1 ml =  $1 \text{ cm}^3$

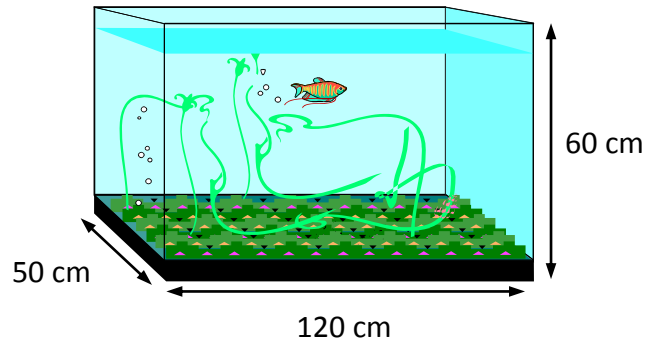
1 litre =  $1000 \text{ cm}^3$  and  $1 \text{ m}^3 = 1000 \text{ litres}$

### Fish tank example

$$\begin{aligned}\text{Volume of fish tank} &= 120 \times 50 \times 60 \\ &= 120 \times 3000 \\ &= 360\,000 \text{ cm}^3\end{aligned}$$

**Volume of fish tank = 360 litres.**

(Check the calculation on your calculator.)

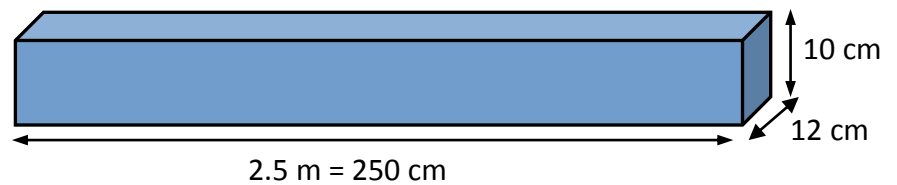


Note the volume of a container for liquids is often called its **capacity**.

It is important that all the dimensions of the cuboid are in the same units.

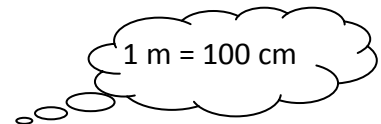
### Concrete block example

Find the volume of a concrete block that is 2.5 metres long, 12 centimetres wide and 10 centimetres high.



Two of the dimensions, the width and height, are in centimetres.

Converting the length to centimetres:  $2.5 \text{ m} = 2.5 \times 100 = 250 \text{ cm}$



$$\begin{aligned}\text{Volume of concrete block} &= 250 \times 12 \times 10 \\ &= 2500 \times 12\end{aligned}$$

**Volume of concrete block = 30 000 cm<sup>3</sup>**

(Check the calculation on your calculator.)

### Sand pit example

A sand pit is 2 metres long and 1.5 metres wide.

How much sand will it take to fill the sandpit to a depth of 20 centimetres?

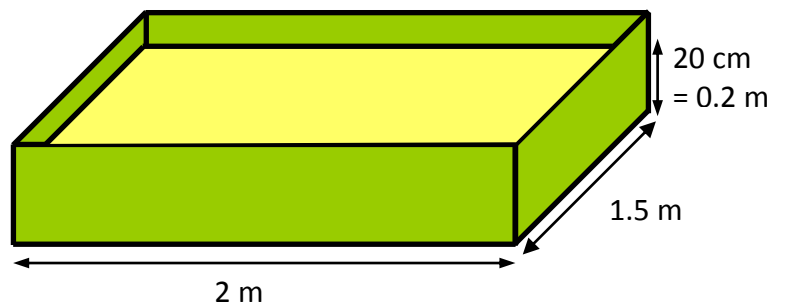
In this case, two of the dimensions, the length and width, are in metres.

Converting the height to metres:  $20 \text{ cm} = 20 \div 100 = 0.2 \text{ m}$

$$\begin{aligned}\text{Volume of sand needed} &= 2 \times 1.5 \times 0.2 \\ &= 3 \times 0.2\end{aligned}$$

**Volume of sand needed = 0.6 m<sup>3</sup>**

(Check the calculation on your calculator.)

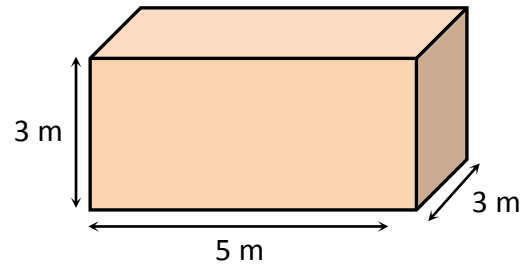


## Try these

Work out your answer for each question in the box.

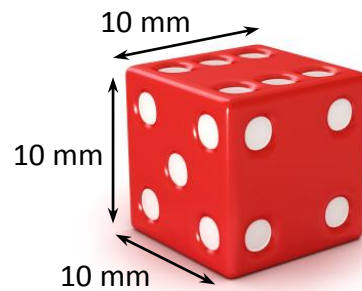
1 A heating engineer needs to work out the volume of this room.

What is its volume?



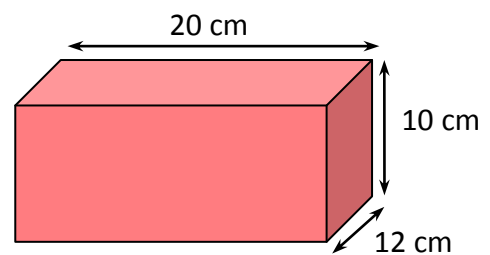
2 All the edges of this dice are 10 mm long.

What is its volume?



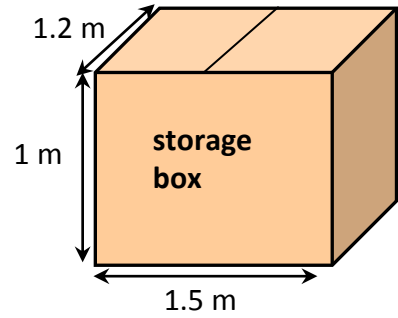
3 A brick is 20 cm long, 12 cm wide and 10 cm high.

What is its volume?



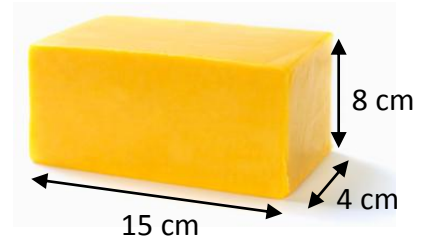
4 A storage box is 1.5 m long, 1.2 m wide and 1 m high.

Find its volume.



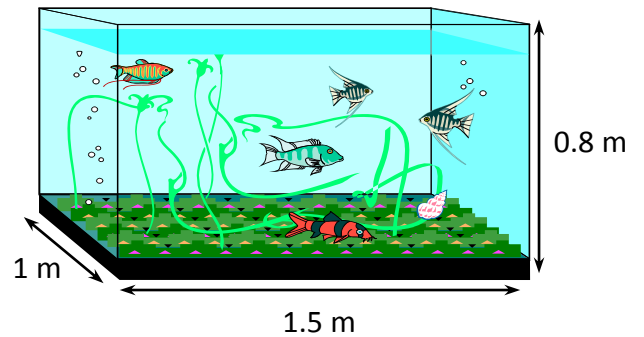
5 The picture shows a block of cheese.

What is its volume?



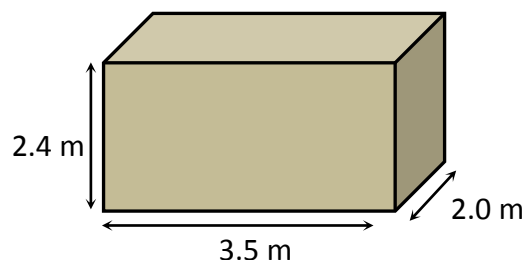
6 The picture shows the dimensions of a fish tank.

Find its volume (capacity) in cubic metres.

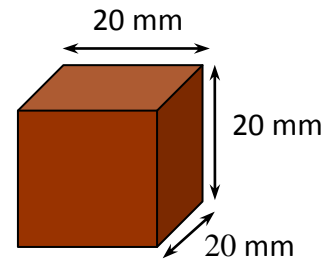


7 The diagram shows the dimensions of a waste disposal container.

What is its volume?



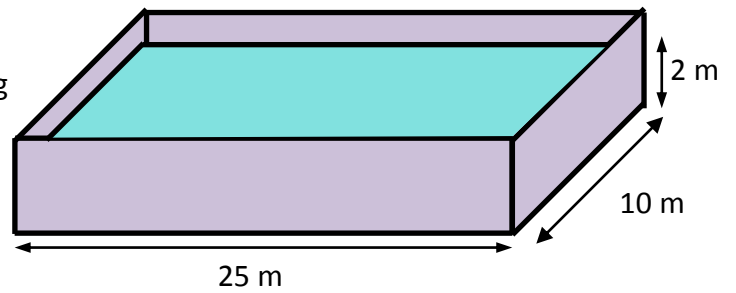
- 8** A stock cube is 20 mm long, 20 mm wide and 20 mm high.  
Calculate its volume.



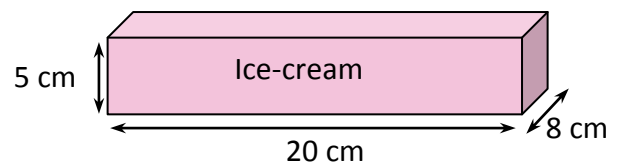
- 9** A carton of orange juice measures 9 cm by 6 cm by 19.5 cm.  
Show that its volume is just over 1 litre.



- 10** A rectangular swimming pool is 25 m long and 10 m wide.  
How many litres of water do you need to fill it to a depth of 2 m?



- 11** Ice-cream mixture is poured into a container to make a block of ice-cream 20 cm long, 8 cm wide and 5 cm high.



- a** Find the volume of the block.  
**b** How many blocks can you make with 4 litres of ice-cream mixture?

**12** A builder plans a tarmac drive for a new house.

The drive is in the shape of a rectangle 12 metres long and 3 metres wide.

The tarmac needs to be 20 cm thick.

What volume of tarmac does the builder need?

**13** A rectangular paddling pool is 2.5 m long and 2 m wide.

How many litres of water do you need to fill it to a depth of 40 cm?

**14** What volume of concrete is needed for a path which is 80 metres long, 1.5 metres wide and 150 mm deep?

### At the end of the activity

- A manufacturer needs to know the volume of a box (cuboid). Explain how to find this.
- What units can volume be measured in?
- Suggest dimensions you could use to make a carton with a volume of 1 litre ( $1000 \text{ cm}^3$ ).