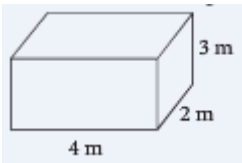
Conversion Factors Can Be Big

The diagram shows a rectangular prism.

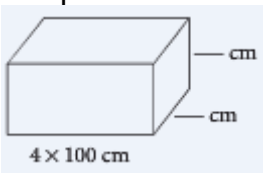


Volume = 4 m × 2 m × 3 m

= m^3

The conversion factor between m and cm is 100.

Convert the dimensions of the above prism to cm.



The volume now = 4 × 100 cm × _____ × _____

= _____ cm^3

This means _____ m^3 = _____ cm^3

The conversion factor between cm^3 and m^3 is _____

Exercise 1

For the following two questions use the technique above.

Q1. a) Find the volume of a 2 cm by 4 cm by 5 cm rectangular prism in cm^3.

b) Now, convert the dimensions to mm (the conversion factor is 10)

c) Find the new volume in mm^3.

Q2. a) Find the volume of a 1 km by 1 km by 1 km cube in km^3.

b) Convert the dimensions to m (the conversion factor is 1000).
Find the volume in m^3.

c) The conversion factor between m^3 and km^3 is

Q3. Use the information in this table to complete the following volume statements.

Volume unit	Abbreviation	Size description
cubic metre	m^3	1 000 000 cm^3
cubic centimetre	cm^3 or cc	1 cm^3 = one-millionth of a cubic metre = 1000 mm^3
cubic millimetre	mm^3	one-thousandth of a cm^3 1000 mm^3 = 1 cm^3

a) 5 cm^3 = mm^3 b) 2 m^3 = cm^3

c) 500 mm^3 = cm^3 d) 0.25 m^3 = cm^3

e) 24000 cm^3 = m^3 f) 36000 mm^3 = cm^3

Q4. What units would you use (mm^3, cm^3, m^3, km^3) to measure the volume of the following objects.

a) a mobile phone b) our maths classroom

Q5. Last week we found the volume of the Earth in km^3. Convert this volume to m^3.

Volume and Capacity

Volume measures the amount of space inside a container while capacity measures the amount of liquid a container will hold.
In the metric system it is easy to convert between the units for volume and capacity.

Volume unit	How much it holds
1 cm^3	1 mL
1000 cm^3	1 L
1 m^3	1000 L

Examples
Convert:
a) 5 cm^3 to mL

1 cm^3 holds 1 mL. The number of cm and mL are always the same. Thus 5 cm^3 holds 5 mL.

b) 1850 mL to litres.

When changing mL to L, we are changing to a bigger unit. The conversion factor between mL and L is 1000. We divide by the conversion factor when we are changing to a larger unit.
1840 mL = 1850 ÷ 1000
= 1.85 L

c) The volume of a large fish pond is 3.4 m^3. How many litres does it hold?

Each m^3 holds 1000 L. We multiply the number of m^3 by 1000.

3.4 m^3 holds 3.4 × 1000 L = 3400 L. The fish pond holds 3400 L of water.

Exercise 3

Q1. Convert each measurement to mL.

a) 8 cm^3 b) 1500 cm^3 c) 425 cm^3

Q2. Convert each measurement to litres.

a) 2000 mL b) 3500 mL c) 250 mL

Q2. Each can in a box of 24 cans of soft drink holds 375 mL. How many litres of soft drink are contained in the box?

Q3. Match the correct capacity (A to J) with the items listed (a to j).

a	car petrol tank	**A**	200 mL
b	a cup of flour	**B**	23 kL
c	bath tub	**C**	5 mL
d	bucket of water	**D**	70 L
e	can of drink	**E**	1250 mL
f	glass of water	**F**	1.875 ML
g	Olympic swimming pool	**G**	250 mL
h	bottle of lemonade	**H**	9 L
i	teaspoon	**I**	375 mL
j	water storage tank	**J**	180 L

Q4. Match the word in the right column to its correct meaning in the left column.

A	A 3-dimensional object with flat sides and identical ends.	**1**	area
B	The distance around the outside of a shape.	**2**	capacity
C	The amount of space occupied by a solid object.	**3**	cube
D	Measures the amount of liquid a container can hold.	**4**	litre
E	A way we measure liquid. One unit is equivalent to 1000 cm^3.	**5**	mass
F	The amount of matter contained in an object. It usually measured in grams, kilograms or tonnes.	**6**	perimeter
G	A solid shape with flat sides. At each end the surface is the same triangle.	**7**	prism
H	The amount of surface or region occupied by a flat object.	**8**	triangular prism
I	A solid shape with flat sides. All the sides have the same length.	**9**	volume

Q4. Our skin releases moisture as a way of controlling body temperature. On average, 200 mL is released per hour. If all of this moisture was captured, how long would it take to fill a 1.25 L soft drink bottle?

Q5. The photograph shows a red bucket in the shape of a rectangular prism. The bottom of the bucket is a square with sides 21 cm.

a) Calculate the area of the bottom of the bucket.

b) The sides of the bucket are 23 cm high. Calculate the volume of the bucket in cm^3.

c) One litre of water is equivalent to 1000 cm^3. Approximately how many litres of water can the bucket hold (to the nearest L).

d) One litre of water weighs 1 kg. Approximately how much water will the bucket weigh when it is half full?

Q6. Find the volume of this solid in cubic meters. Show working.

Cylinder height = 15 m

Cone height = 3 m

Diameter = 4 m

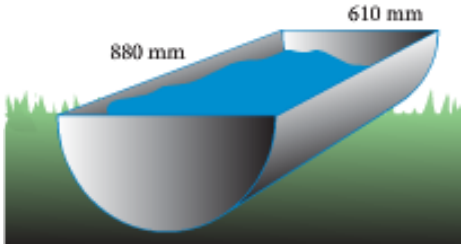
Q7.

The tank on this truck consists of two hemispheres and a cylinder. The diameter is 2.9 m and the length of the cylinder is 9.5 m. Calculate the volume of the tank in megalitres.

Week 5 Investigation

Answer the following question using the necessary formulae, and showing all working neatly and clearly.

Harry runs a farm. He uses half-cylinders water troughs, as shown, for the animals.



a) Calculate the volume of one water trough in cubic metres.

b) How much water is needed to fill one trough?

c) There are 25 water troughs on the farm. How much water is needed to fill all the troughs?

d) Harry uses a cylindrical tank on a trailer to fill the water troughs. Calculate the volume of the tank if its diameter is 1,560 mm and its height is 1,210 mm.

e) Can this tank hold enough water to fill all the troughs? If not, how many trips will Harry have to make?