Find the total volume of each figure. Measurement is in cm (not to scale).

1)
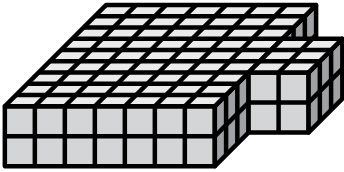
$7×2×9 = 126$
$2×2×3 = 12$

2)
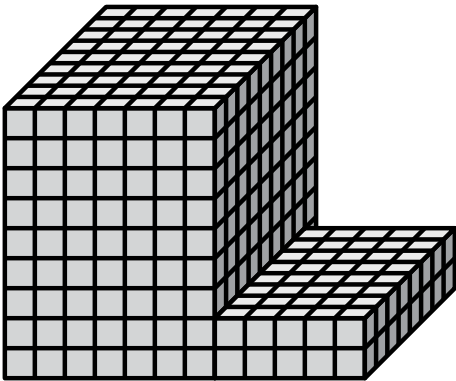
$7×9×9 = 567$
$5×2×8 = 80$

3)
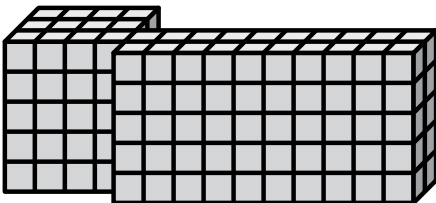
$4×5×3 = 60$
$10×5×2 = 100$

4)
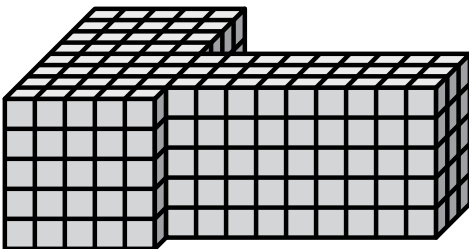
$5×5×8 = 200$
$9×5×3 = 135$

The Cubic Metre

At Home
At School

Quick Review

A line segment has only one dimension.
It is measured using **linear units** such as centimetres and metres.

A flat surface has two dimensions.
The area it covers is measured using **square units** such as square centimetres or square metres.

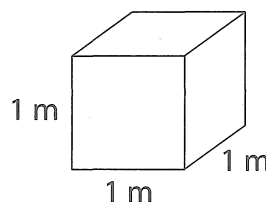An object has three dimensions.
The space it occupies is measured using **cubic units** such as cubic centimetres or cubic metres.
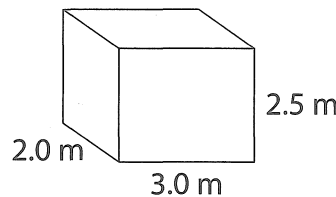
A cube with edge length 1 m has volume one cubic metre, or 1 m³.

$1 \text{ m}^3 = 100 \text{ cm} \times 100 \text{ cm} \times 100 \text{ cm}$
$= 1\ 000\ 000 \text{ cm}^3$

1 m
1 m
1 m

To find the volume of a rectangular prism in cubic metres, we find the product of the length, width, and height in metres.

Volume $= 3.0 \text{ m} \times 2.0 \text{ m} \times 2.5 \text{ m}$
$= 6.0 \text{ m}^2 \times 2.5 \text{ m}$
$= 15.0 \text{ m}^3$

The volume of this prism is 15 m³.
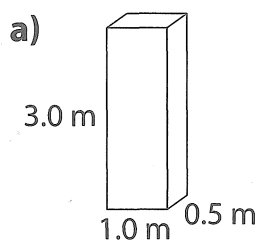
2.5 m
2.0 m
3.0 m

Try These

1. Would you use a linear, square, or cubic unit to measure?
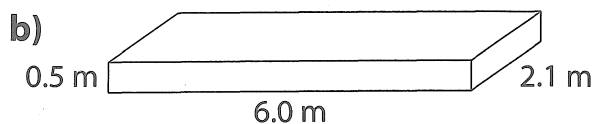
   a) area of a desk pad **square unit**   b) space in an elevator **cubic unit**

   c) length of a pen **linear unit**   d) perimeter of a dog run **linear unit**
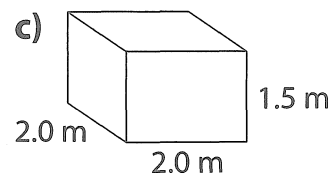
1. Find the volume of each box in cubic metres.

a)

3.0 m

1.0 m 0.5 m

__**1.5 m³**__

b)

0.5 m

6.0 m   2.1 m

__**6.3 m³**__

c)

1.5 m

2.0 m

2.0 m

__**6 m³**__

2. Name 2 objects whose volume is: **Sample Answers**

   a) greater than 1 m³ __**an elevator; a closet**__

   b) less than 1 m³ __**a pencil box; a tissue box**__

   c) about 1 m³ __**a dog crate; a computer box**__

3. A packing box is a rectangular prism with volume 1 m³.
   The box is 250 cm long and 100 cm wide. How tall is the box? __**40 cm**__

4. What unit would you use to measure: **Sample Answers**

   a) the area of a postage stamp? __**square millimetre**__
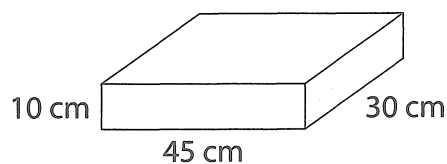
   b) the volume of a moving van? __**cubic metre**__

   c) the distance from North Bay, ON, to Vancouver, BC? __**kilometre**__

Stretch Your Thinking

Find the volume of this box in cubic metres.

__**0.0135 m³**__

10 cm

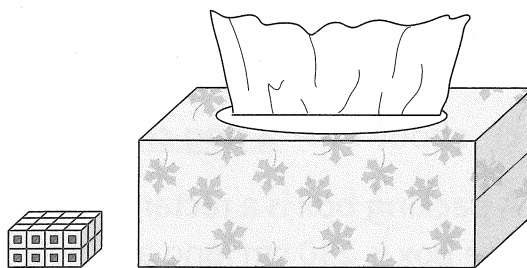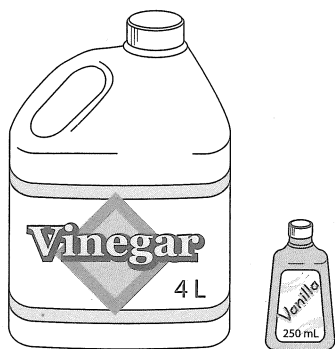45 cm   30 cm

Capacity and Volume

Quick Review

Units of both volume and capacity are used to measure the "size" of three-dimensional objects.

Units of capacity are used to measure liquids or gases and the containers that hold them.

Units of volume are used to measure the space an object occupies.

Use these relationships to convert between units of volume and capacity:

$$1 \text{ cm}^3 = 1 \text{ mL} \qquad 1 \text{ m}^3 = 1000 \text{ L} \qquad 1000 \text{ cm}^3 = 1 \text{ L}$$

$$255 \text{ cm}^3 = \frac{255}{1000} \text{ L} \qquad 6.7 \text{ m}^3 = 6.7 \times 1000 \text{ L} \qquad 724 \text{ L} = \frac{724}{1000} \text{ m}^3$$
$$= 0.255 \text{ L} \qquad\qquad\quad = 6700 \text{ L} \qquad\qquad\quad = 0.724 \text{ m}^3$$

Try These

1. Complete.

   a) 1750 mL = _____**1.75**_____ L

   b) 7 m³ = _____**7 000 000**_____ cm³

   c) 200 000 cm³ = _____**0.2**_____ m³

   d) 6 m³ = _____**6000**_____ L

   e) 75 mL = _____**75**_____ cm³

   f) 317 cm³ = _____**0.317**_____ L

   g) 94 cm³ = _____**94**_____ mL

   h) 4.2 L = _____**4200**_____ cm³

2. How many litres of water would it take to fill a swimming pool 9 m long, 5 m wide, and 2 m deep? _____**90 000 L**_____

1. Circle the best estimate of volume or capacity.

   a) a barrel of water   75 mL   (180 L)   150 m³

   b) a bowl of porridge   20 L   (400 mL)   35 cm³
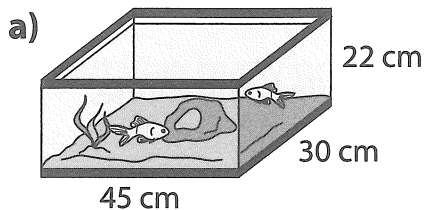
   c) a moving van   (135 m³)   4 m³   75 L

2. Selena's rectangular swimming pool holds 36 000 L of water.

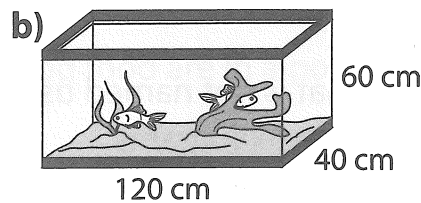   a) Find the volume of water in cubic metres. _____**36 m³**_____

   b) The pool is 2 m deep. How long and how wide might it be?
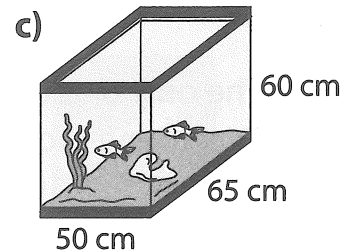   **Sample Answer: It could be 6 m long and 3 m wide.**

3. Find the volume of water, in litres, needed to fill each fish tank.

   a)

   22 cm

   30 cm

   45 cm

   b)

   60 cm

   40 cm

   120 cm

   c)

   60 cm

   65 cm

   50 cm

   ____**29.7 L**____   ____**288 L**____   ____**195 L**____

4. Look at a milk carton. **Sample Answers**
   How much milk does it contain in litres? ____**1**____ In millilitres? ____**1000**____

   Write this amount in cubic centimetres. ____**1000 cm³**____

5. Describe how you might find the volume of a golf ball. **Sample Answer**
   Pour 250 mL of water into a measuring cup. Add the golf ball. Read

   the new level to find the volume of the water and the ball. Subtract

   250 mL from the new level. Convert the reading to cubic centimetres.

Stretch Your Thinking

One kilolitre is equal to 1000 L.
How many kilolitres of water would it take to fill a pool 9 m × 6 m × 2 m?

   ____**108 kilolitres**____