

Volume and capacity

WALT find volume and capacity

Success Criteria I can convert volume into capacity and vice versa

Volume refers to the amount of space occupied by an object.

Capacity refers to the quantity, usually of liquid, that can be contained by a solid.

$$1 \text{ L (1000 mL)} = 1000 \text{ cm}^3$$

and

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

Exercise 5D

1 Find the capacity in mL of a container that has a volume of:

- | | | | |
|-------------------------------|-------------------------------|---------------------------------|------------------------------|
| a 30 cm ³ | b 60 cm ³ | c 20 cm ³ | d 25 cm ³ |
| e 85 cm ³ | f 45 cm ³ | g 4 cm ³ | h 34 cm ³ |
| i 53 cm ³ | j 500 cm ³ | k 700 cm ³ | l 600 cm ³ |
| m 5000 cm ³ | n 3000 cm ³ | o 11 000 cm ³ | p 7.5 cm ³ |

EXAMPLE 2

What is the volume in cm³ of a container that has a capacity of:

- a** 20 mL? **b** 63 mL? **c** 4000 mL?

The conversion is 1 mL = 1 cm³. !

- a** 20 mL = 20 cm³ **b** 63 mL = 63 cm³ **c** 4000 mL = 4000 cm³

2 Find the volume in cm³ of a container that has a capacity of:

- | | | | |
|------------------|------------------|--------------------|-----------------|
| a 50 mL | b 70 mL | c 30 mL | d 45 mL |
| e 25 mL | f 65 mL | g 6 mL | h 54 mL |
| i 21 mL | j 400 mL | k 600 mL | l 900 mL |
| m 7000 mL | n 5000 mL | o 12 000 mL | p 7.5 mL |

Check your answers

- 1**
- | | | |
|------------------|------------------|--------------------|
| a 30 mL | b 60 mL | c 20 mL |
| d 25 mL | e 85 mL | f 45 mL |
| g 4 mL | h 34 mL | i 53 mL |
| j 500 mL | k 700 mL | l 600 mL |
| m 5000 mL | n 3000 mL | o 11 000 mL |
| p 7.5 mL | | |
- 2**
- | | | |
|-------------------------------|-------------------------------|---------------------------------|
| a 50 cm ³ | b 70 cm ³ | c 30 cm ³ |
| d 45 cm ³ | e 25 cm ³ | f 65 cm ³ |
| g 6 cm ³ | h 54 cm ³ | i 21 cm ³ |
| j 400 cm ³ | k 600 cm ³ | l 900 cm ³ |
| m 7000 cm ³ | n 5000 cm ³ | o 12 000 cm ³ |
| p 7.5 cm ³ | | |

EXAMPLE 3

What is the capacity in litres of a container that can hold:

- a** 5000 cm³? **b** 3250 cm³? **c** 97 820 cm³?

a 5000 cm³ = 5000 ÷ 1000
= 5 L

b 3250 cm³ = 3250 ÷ 1000
= 3.25 L

c 97 820 cm³ = 97 820 ÷ 1000
= 97.82 L

The conversion is 1000 cm³ = 1 L. !

3 Complete to find the capacity in litres of a container that can hold the following volumes.

- a** 3000 cm³ = 3000 ÷ 1000 = ___ L **b** 6000 cm³ = 6000 ÷ ___ = ___ L **c** 2000 cm³ = ___ ÷ ___ = ___ L

4 Find the capacity in litres of a container that can hold the following volumes.

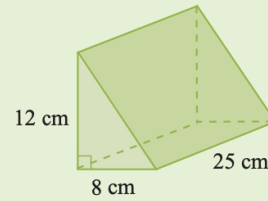
- a** 75 000 cm³ **b** 35 000 cm³ **c** 65 000 cm³
d 4200 cm³ **e** 3400 cm³ **f** 5300 cm³
g 2535 cm³ **h** 3773 cm³ **i** 7688 cm³

Dividing by 1000 moves the decimal point 3 places to the left. !

EXAMPLE 7

For this prism find its:

- a volume in cm^3
- b capacity in mL
- c capacity in L.



a $V = \text{area of base} \times \text{height}$
 $= \left(\frac{1}{2} \times b \times h\right) \times \text{height}$
 $= \left(\frac{1}{2} \times 8 \times 12\right) \times 25$
 $= 1200 \text{ cm}^3$

b $1 \text{ cm}^3 = 1 \text{ mL}$
 $\therefore \text{Capacity} = 1200 \text{ mL}$

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



c $1 \text{ L} = 1000 \text{ mL}$
 $\therefore \text{Capacity} = \frac{1200}{1000} \text{ L} = 1.2 \text{ L}$

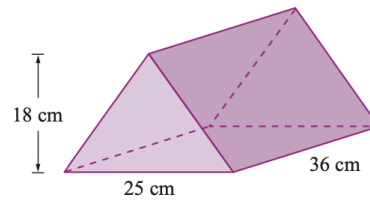
- 14 a Complete to find the volume of this prism in cm^3 .

$$V = \text{area of base} \times \text{height}$$

$$= \frac{1}{2}(b \times h) \times H$$

$$= \frac{1}{2} \times (\underline{\quad} \times 18) \times \underline{\quad}$$

$$= \underline{\quad} \times \underline{\quad} = \underline{\quad} \text{ cm}^3$$



- b Complete to find the capacity of this prism in mL.

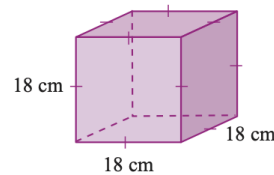
$$1 \text{ cm}^3 = 1 \text{ mL} \quad \therefore \text{Capacity} = \underline{\quad} \text{ mL}$$

- c Complete to find the capacity of this prism in L.

$$1 \text{ L} = 1000 \text{ mL} \quad \therefore \text{Capacity} = \frac{\square}{1000} \text{ L} = \underline{\quad} \text{ L}$$

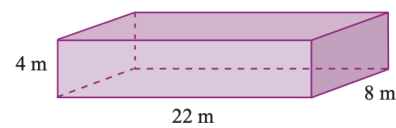
- 15 This cube has a side length of 18 cm.

- a Find the volume in cm^3 .
- b Find the capacity in mL.
- c Find the capacity in L.



- 16 A rectangular prism measures 22 m by 4 m by 8 m.

- a Find the volume in cm^3 .
- b Find the capacity in mL.
- c Find the capacity in L.
- d Find the capacity in kL.



17 A rectangular water storage tank measures 2.9 m by 7.5 m by 2.5 m.

a Find its volume in cm^3 .

b Find its capacity in L.



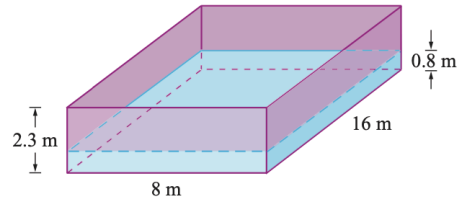
18 The internal dimensions of a refrigerator are height = 1.8 m, width = 84 cm and depth = 60 cm.

a Find the internal volume in cm^3 .

b Find the capacity in L.

Change all measurements to the same units. !

19 The diagram shows a swimming pool 16 m long and 8 m wide.



a How many litres of water are needed to fill the pool to a depth of 0.8 m?

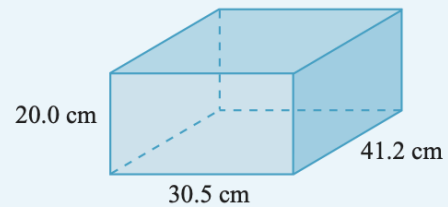
b How much more water is needed to fill the pool to a depth of 2.3 m?

c Calculate the cost of filling the pool from empty if water costs 25.8 cents per kilolitre.

A small fish tank is in the shape of a rectangular prism with dimensions $20.0 \text{ cm} \times 30.5 \text{ cm} \times 41.2 \text{ cm}$.

a Calculate the volume of the fish tank.

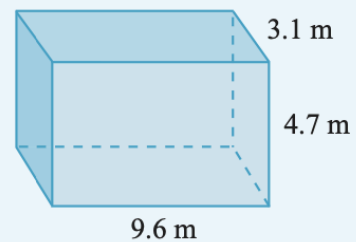
b What is the capacity of the tank in litres?



A rectangular tank is used to store water.

a Calculate its volume in m^3 .

b Calculate its capacity in litres.



- 3** a $3000 \text{ cm}^3 = 3000 \div 1000 = 3 \text{ L}$
 b $6000 \text{ cm}^3 = 6000 \div 1000 = 6 \text{ L}$
 c $2000 \text{ cm}^3 = 2000 \div 1000 = 2 \text{ L}$
- 4** a 75 L b 35 L c 65 L
 d 4.2 L e 3.4 L f 5.3 L
 g 2.535 L h 3.773 L i 7.688 L
- 5** a $3 \text{ L} = 3 \times 1000 = 3000 \text{ cm}^3$
 b $8 \text{ L} = 8 \times 1000 = 8000 \text{ cm}^3$
 c $7 \text{ L} = 7 \times 1000 = 7000 \text{ cm}^3$
- 6** a 4200 cm^3 b 5300 cm^3 c 8900 cm^3
 d 6450 cm^3 e 5440 cm^3 f 3210 cm^3
 g 4495 cm^3 h 6293 cm^3 i 8443 cm^3
 j $70\,000 \text{ cm}^3$ k $50\,000 \text{ cm}^3$ l $120\,000 \text{ cm}^3$
- 7** a mL b L c L d mL e L
 f mL g mL h L i mL
- 8** a $4000 \text{ L} = 4000 \div 1000 = 4 \text{ m}^3$
 b $330 \text{ L} = 330 \div 1000 = 0.33 \text{ m}^3$
 c $0.4 \text{ kL} = 0.4 \times 1 = 0.4 \text{ m}^3$
- 9** a 12 m^3 b 9.5 m^3 c 7.25 m^3
 d 0.67 m^3 e 0.136 m^3 f 0.025 m^3
 g 12.5 m^3 h 8.3 m^3 i 5 m^3
 j 0.6 m^3 k 0.75 m^3 l 0.09 m^3
- 10** a $0.05 \text{ m}^3 = 0.05 \div 1 = 0.05 \text{ kL}$
 b $580 \text{ m}^3 = 580 \div 1 = 580 \text{ kL}$
 c $7000 \text{ m}^3 = 7000 \div 1 = 7000 \text{ kL}$

- 11** a 0.01 kL b 0.9 kL c 480 kL
 d 295 kL e 890 kL f 6500 kL
 g 7200 kL h 9000 kL i 12 940 kL
 j 14 750 kL k 18 500 kL l 23 000 kL
- 12** a $2000 \text{ m}^3 = 2000 \div 1000 = 2 \text{ ML}$
 b $600 \text{ m}^3 = 600 \div 1000 = 0.6 \text{ ML}$
 c $0.8 \text{ m}^3 = 0.8 \div 1000 = 0.0008 \text{ ML}$
 d 6 ML e 0.42 ML f 0.075 ML
- 13** a $5 \text{ ML} = 5 \times 1000 = 5000 \text{ m}^3$
 b $6.2 \text{ ML} = 6.2 \times 1000 = 6200 \text{ m}^3$
 c $50 \text{ ML} = 50 \times 1000 = 50\,000 \text{ m}^3$
 d $28\,000 \text{ m}^3$ e $15\,620 \text{ m}^3$ f 300 m^3
- 14** a $\frac{1}{2} \times (25 \times 18) \times 36$
 $= 225 \times 36$
 $= 8100 \text{ cm}^3$
 b $1 \text{ cm}^3 = 1 \text{ mL} \therefore \text{Capacity} = 8100 \text{ mL}$
 c $1 \text{ L} = 1000 \text{ mL} \therefore \text{Capacity} = \frac{8100}{1000} \text{ L} = 8.1 \text{ L}$
- 15** a 5832 cm^3 b 5832 mL c 5.832 L
- 16** a $704\,000\,000 \text{ cm}^3$ b $704\,000\,000 \text{ mL}$
 c 704 000 L d 704 kL
- 17** a $54\,375\,000 \text{ cm}^3$ b 54 375 L
- 18** a $907\,200 \text{ cm}^3$ b 907.2 L
- 19** a 102 400 L b 192 000 L c \$75.96