

E5.1 Units of measure

Name: _____ Class: _____ Date: _____

Total: 12 marks**KEY WORDS** convert 换算 • capacity 容量 • area 面积 • volume 体积 • tonne 吨

Objective

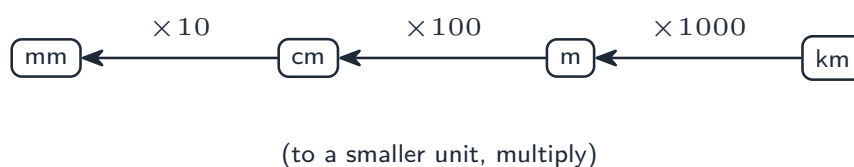
Build the skills to answer Extended exam questions on **units of measure** 计量单位 — converting between units of **length** 长度, **area** 面积, **volume** 体积, **capacity** 容量 and **mass** 质量, and knowing why an area conversion is not the same as a length conversion.

You must be able to:

- convert between mm, cm, m and km, and between g, kg and tonnes
- convert areas and volumes, squaring or cubing the length conversion factor
- convert between cm^3 , millilitres and litres

1 Worked examples

■ Square the factor for an area, cube it for a volume



Each rung is $\times 10$ for length — but $\times 100$ for area and $\times 1000$ for volume

length	area	volume
1 cm = 10 mm	1 cm^2 = 100 mm^2	1 cm^3 = 1000 mm^3
1 m = 100 cm	1 m^2 = 10 000 cm^2	1 m^3 = 1 000 000 cm^3
1 km = 1000 m	1 km^2 = 1 000 000 m^2	

- **Capacity:** 1 cm^3 = 1 ml, so 1 litre = 1000 cm^3 and 1 m^3 = 1000 litres.
- **Mass:** 1 kg = 1000 g and 1 tonne = 1000 kg.
- **The commonest error** is converting an area as if it were a length: 24 000 cm^2 is 2.4 m^2 , not 240 m^2 .
- **Convert before calculating**, not after — mixing metres and centimetres inside

one formula is the other common loss.

Answer shapes (marked by **method marks** — M1 for a correct method, A1 for the correct answer): the conversion line is a method mark in its own right, so write it out rather than doing it on the calculator.

2 Practice

2.1 Convert 3.5 m into centimetres. [1]

2.2 Convert 24 000 cm² into square metres. [2]

2.3 Convert 0.75 litres into cm³. [1]

3 Exam-style questions

3.1 A rectangle measures 2.4 m by 80 cm.

(a) Find its area in square metres. [3]

(b) Write that area in square centimetres. [2]

3.2 A tank holds 4.5 m³ of water. Find this volume in litres. [3]

Solutions

Marking: **M1** a correct method, **A1** the correct answer.

Each answer shows the steps, then the **result**.

2.1

- 3.5×100
 $= \mathbf{350 \text{ cm}}$

2.2

- $1 \text{ m}^2 = 100 \times 100 = 10\,000 \text{ cm}^2$, so divide by 10 000
 $24\,000 \div 10\,000 = \mathbf{2.4 \text{ m}^2}$

2.3

- $1 \text{ litre} = 1000 \text{ cm}^3$
 $0.75 \times 1000 = \mathbf{750 \text{ cm}^3}$

3.1

(a)

- convert first: $80 \text{ cm} = 0.8 \text{ m}$
- area $= 2.4 \times 0.8$
 $= \mathbf{1.92 \text{ m}^2}$

(b)

- multiply by 10 000, because this is an AREA
 $1.92 \times 10\,000 = \mathbf{19\,200 \text{ cm}^2}$

3.2

- $1 \text{ m}^3 = 1\,000\,000 \text{ cm}^3$, so $4.5 \text{ m}^3 = 4\,500\,000 \text{ cm}^3$
- $1000 \text{ cm}^3 = 1 \text{ litre}$
 $4\,500\,000 \div 1000 = \mathbf{4500 \text{ litres}}$