MARKING GUIDELINE

MARKS	DURATION	QUESTIONS
40	1 hour	4

Name: _____ Class: _____

Date: _____

MARK ____ / 40

INSTRUCTIONS AND INFORMATION

1. Answer **ALL** the questions in this question paper.
2. Answer QUESTION 1 by **circling** the letter (A–D) in the answer grid at the end of that section.
3. Show **ALL** calculations clearly.
4. Show all units where applicable.
5. Number the answers correctly according to the numbering system used in this question paper.
6. A non-programmable calculator may be used, unless stated otherwise.
7. Write neatly and legibly.

QUESTION 1 [10 MARKS]

Four options are given as possible answers to the following questions. Choose the correct answer and circle the letter (A–D) in the grid at the end of this section. If you want to change your choice, put a cross through the wrong letter and circle your new choice.

1.1 The volume of a rectangular prism 6 cm by 4 cm by 5 cm is ... (1)

A) 30 cm^3 **B)** 148 cm^3

C) 15 cm^3 **D) 120 cm^3 ✓**

Answer: D — $V = l \times b \times h$.

- **A** — used only two dimensions
- **B** — that is the SURFACE AREA
- **C** — added the three dimensions

1.2 The surface area of that same prism is ... (1)

A) 120 cm^2 **B)** 74 cm^2

C) 148 cm^2 ✓ **D)** 15 cm^2

Answer: C — $2(6 \times 4 + 6 \times 5 + 4 \times 5) = 2(24 + 30 + 20)$.

- **A** — that is the VOLUME
- **B** — forgot to double
- **D** — added the dimensions

1.3 A cube has sides of 4 cm. Its volume is ... (1)

A) 64 cm^3 ✓ **B)** 96 cm^3

C) 16 cm^3 **D)** 12 cm^3

Answer: A — $4^3 = 64$.

- **B** — that is the surface area
- **C** — that is 4 SQUARED
- **D** — multiplied 4 by 3

1.4 The surface area of that cube is ... (1)

A) $16\ cm^2$ **B)** $64\ cm^2$

C) $24\ cm^2$ **D)** **$96\ cm^2$** ✓

> **Answer: D** — 6 faces of 4^2: 6×16.
> - **A** — that is ONE face
> - **B** — that is the VOLUME
> - **C** — used 6×4

1.5 The volume of ANY prism is ... (1)

A) **area of the cross-section × length** ✓ **B)** length × breadth × height, always

C) perimeter × length **D)** half the base × height

> **Answer: A** — A prism is its cross-section stacked along its length.
> - **B** — that works only for a rectangular prism
> - **C** — perimeter gives a surface, not a volume
> - **D** — that is the area of a triangle

1.6 A triangular prism has a cross-section of area $20\ cm^2$ and a length of 12 cm. Its volume is ... (1)

A) $480\ cm^3$ **B)** $32\ cm^3$

C) **$240\ cm^3$** ✓ **D)** $120\ cm^3$

> **Answer: C** — $20 \times 12 = 240$.
> - **A** — doubled the answer
> - **B** — added instead of multiplying
> - **D** — halved the answer unnecessarily

1.7 Volume is measured in cm^3 but surface area in cm^2 because ... (1)

A) area is always smaller **B)** volume is bigger

C) the units are interchangeable **D)** **volume fills THREE dimensions and area covers two** ✓

> **Answer: D** — Three lengths multiplied give a cubic unit; two give a square unit.
> - **A** — a thin sheet can have a large area and little volume
> - **B** — the numbers are not what decide the unit
> - **C** — they are not interchangeable

1.8 $1\ cm^3$ is the same as ... (1)

A) **1 mℓ** ✓ **B)** 1 ℓ

C) 10 mℓ **D)** 1 000 ℓ

> **Answer: A** — $1\ cm^3 = 1$ mℓ, and $1\ 000\ cm^3 = 1$ ℓ.
> - **B** — that is $1\ 000\ cm^3$
> - **C** — $1\ cm^3$ is 1 mℓ, not 10
> - **D** — far too large — that is a cubic metre

1.9 A box holds $2\,000\ \text{cm}^3$. In litres that is ... (1)

A) $20\ \ell$ **B)** $2\ \ell$ ✓

C) $200\ \ell$ **D)** $0{,}2\ \ell$

> **Answer: B** — $2\,000 \div 1\,000 = 2\ \ell$.
>
> - **A** — divided by 100
> - **C** — divided by 10
> - **D** — divided by 10 000

1.10 If ALL the dimensions of a box are doubled, its volume is multiplied by ... (1)

A) 4 **B)** 8 ✓

C) 6 **D)** 2

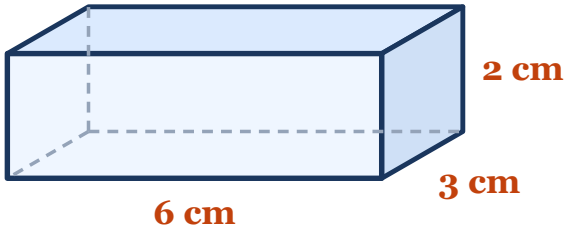
> **Answer: B** — Volume scales by the CUBE of the length factor: 2^3.
>
> - **A** — that is the AREA factor
> - **C** — that is the number of faces
> - **D** — that is the LENGTH factor

ANSWER GRID — MARKING GUIDELINE

1.1	A	B	C	(D)
1.2	A	B	(C)	D
1.3	(A)	B	C	D
1.4	A	B	C	(D)
1.5	(A)	B	C	D
1.6	A	B	(C)	D
1.7	A	B	C	(D)
1.8	(A)	B	C	D
1.9	A	(B)	C	D
1.10	A	(B)	C	D

QUESTION 2 [10 MARKS]

The diagram below shows a rectangular prism (a box).



2.1 Write down the formula for the volume of a rectangular prism, and explain why its SURFACE AREA needs a different formula. **(3)**

> $V = l \times b \times h$ *(1)*
> Volume multiplies THREE dimensions, because it measures the space the prism fills *(1)*
> Surface area ADDS the areas of the six flat faces, which gives $2(lb + lh + bh)$ *(1)*

2.2 Calculate the volume of the box. **(3)**

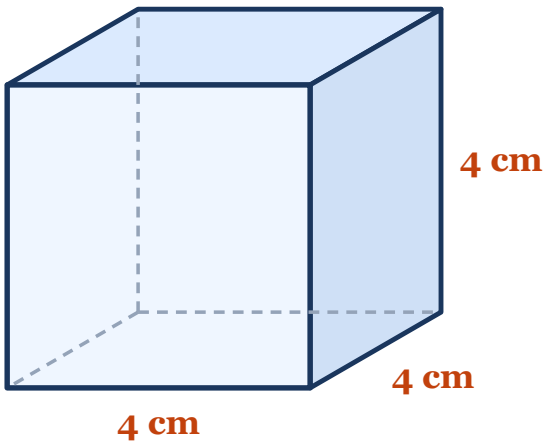
> $V = 6 \times 3 \times 2$ *(2)*
> $= \mathbf{36\ cm^3}$ *(1)*

2.3 A different box measures 5 cm by 4 cm by 2 cm. Calculate its surface area. **(4)**

> $SA = 2(lb + lh + bh)$ *(1)*
> $= 2(20 + 10 + 8)$ *(2)*
> $= \mathbf{76\ cm^2}$ *(1)*

QUESTION 3 [11 MARKS]

The diagram below shows a cube with sides of 4 cm.



3.1 Calculate the volume of the cube. (3)

> $V = s^3$ *(1)*
> $= 4 \times 4 \times 4$ *(1)*
> $=$ **64 cm³** *(1)*

3.2 Calculate the surface area of the cube. (3)

> A cube has 6 identical square faces *(1)*
> $SA = 6 \times 4^2$ *(1)* $=$ **96 cm²** *(1)*

3.3 The cube is filled with water. Determine the capacity of the cube in millilitres. (3)

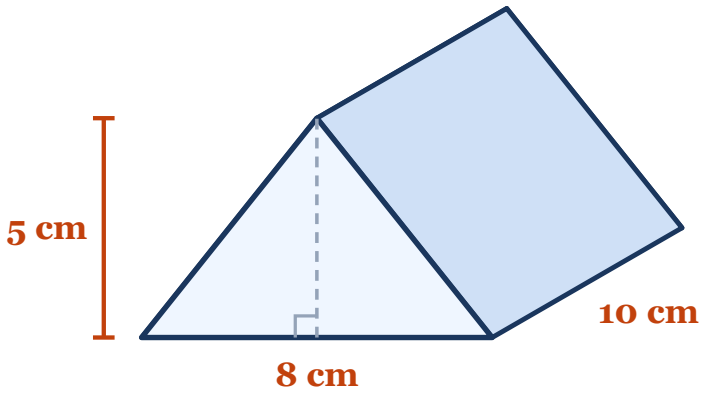
> $1\ cm^3 = 1$ mℓ *(1)*
> $64\ cm^3 =$ **64 mℓ** *(2)*

3.4 Explain why volume is measured in cm^3 but surface area in cm^2. (2)

> Volume fills three dimensions — length, breadth and height *(1)*; surface area covers only the two-dimensional faces *(1)*

QUESTION 4 [9 MARKS]

The diagram below shows a triangular prism.



4.1 Calculate the area of the triangular cross-section, and state which of the two measurements you used is the perpendicular height. **(3)**

> $A = \frac{1}{2} \times 8 \times 5 = \mathbf{20\ cm^2}$ *(2)*
> The **5 cm** is the perpendicular height — it is measured at right angles to the 8 cm base *(1)*

4.2 Hence calculate the volume of the prism. **(3)**

> V = area of cross-section × length *(1)*
> $= 20 \times 10$ *(1)* $= \mathbf{200\ cm^3}$ *(1)*

4.3 A different prism has a cross-sectional area of $15\ cm^2$ and a volume of $120\ cm^3$. Calculate its length, and state what happens to the volume if that length is doubled. **(3)**

> V = area of cross-section × length, so length $= 120 \div 15$ *(1)*
> $=$ **8 cm** *(1)*
> The volume DOUBLES to $240\ cm^3$, because volume is directly proportional to length *(1)*

TOTAL: 40 marks

This question paper consists of 4 questions.

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