Given name/s	

Family name	

Teacher		Class	

School name	

Common internal assessment 2023 — Phase 5

Question and response book

Essential Mathematics

Time allowed

- Perusal time — 5 minutes
- Working time — 60 minutes

General instructions

- Answer all questions in this question and response book.
- Write using black or blue pen.
- QCAA-approved calculator permitted.
- Ruler required.
- QCAA formula book provided.
- Planning paper will not be marked.

Part A: Simple (40 marks)

- 9 short response questions

Part B: Complex (10 marks)

- 2 short response questions

Queensland Government | QCAA Queensland Curriculum & Assessment Authority

Instructions

- Questions worth more than one mark require mathematical reasoning and/or working to be shown to support answers.
- If you need more space for a response, use the additional pages at the back of this book.
  - On the additional pages, write the question number you are responding to.
  - Cancel any incorrect response by ruling a single diagonal line through your work.
  - Write the page number of your alternative/additional response, i.e. See page …
  - If you do not do this, your original response will be marked.

Part A: Simple

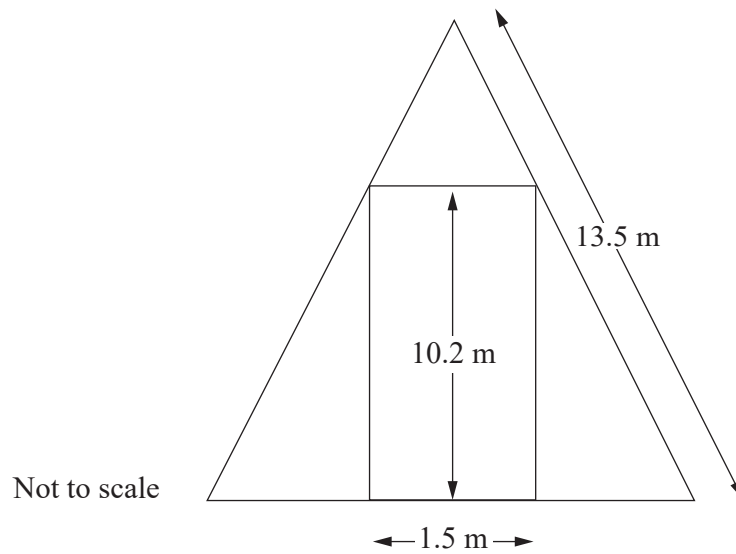- This part has nine questions and is worth 40 marks.

DO NOT WRITE ON THIS PAGE

THIS PAGE WILL NOT BE MARKED

QUESTION 1 (4 marks)

A stage has been designed in the shape of an equilateral triangle. There is a rectangular section inside the stage, as shown.

13.5 m

10.2 m

Not to scale

←1.5 m→

a) Calculate the perimeter of the entire triangular stage in metres.

[2 marks]

_____

_____

_____

b) Use leading-digit approximation to estimate the area of the rectangular section in square metres.

[2 marks]

_____

_____

_____

QUESTION 2 (5 marks)

A parent recorded the time (in hours) their child spent on social media during a school week, as shown.
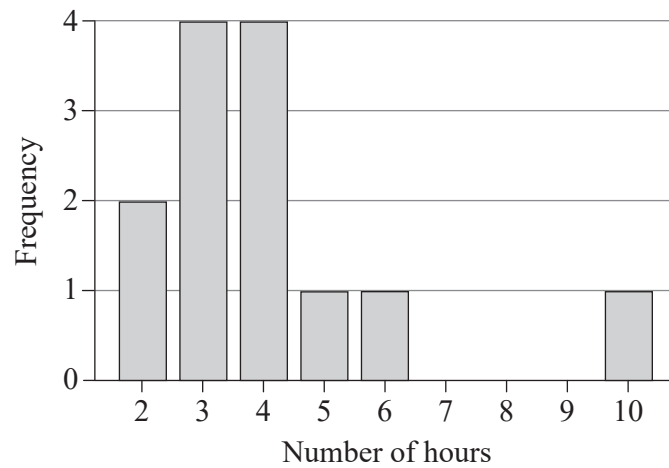
a) Calculate the median time spent on social media. *[2 marks]*

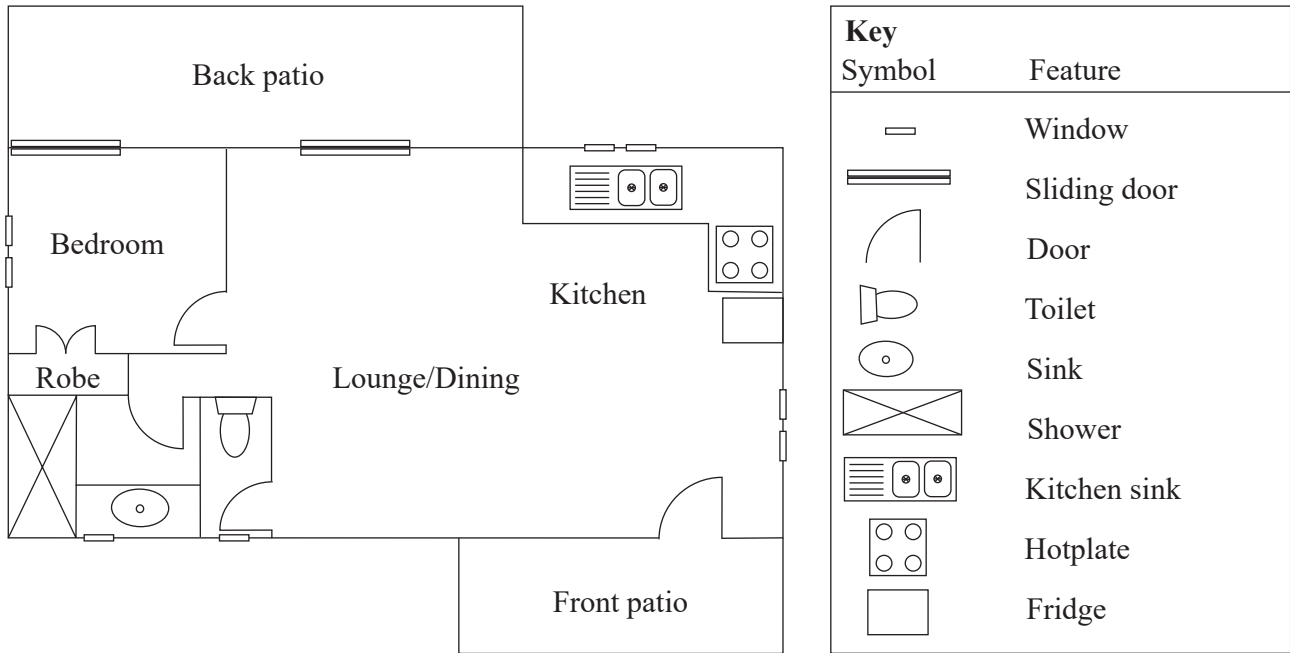b) Determine the mean time spent on social media. *[2 marks]*

c) Describe the spread of the dataset. *[1 mark]*

QUESTION 3 (5 marks)

A couple have drawn a scaled house plan, as shown.

Back patio	**Key**
Bedroom	Symbol	Feature
	Window
	Sliding door
Kitchen	Door
Robe Lounge/Dining	Toilet
	Sink
	Shower
	Kitchen sink
Front patio	Hotplate
	Fridge

a)   How many sliding doors are there?   *[1 mark]*

_____

b)   The plan is labelled with a scale of 10 mm : 80 cm. Interpret what this scale means.   *[1 mark]*

_____

_____

The dimensions of the front patio on the plan are 43 mm × 15 mm.

c)   Calculate the actual area of the front patio in square metres.   *[2 marks]*
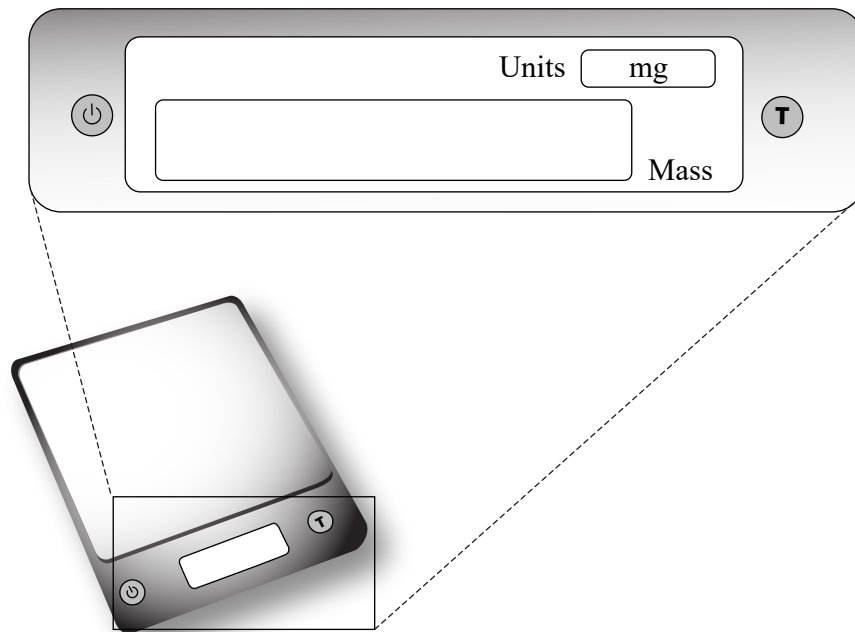
_____

_____

_____

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_____

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The construction company asks the couple to mail them their house plan, which was weighed at 0.026 g.

When weighed on a post office scale, the mass is displayed in milligrams.

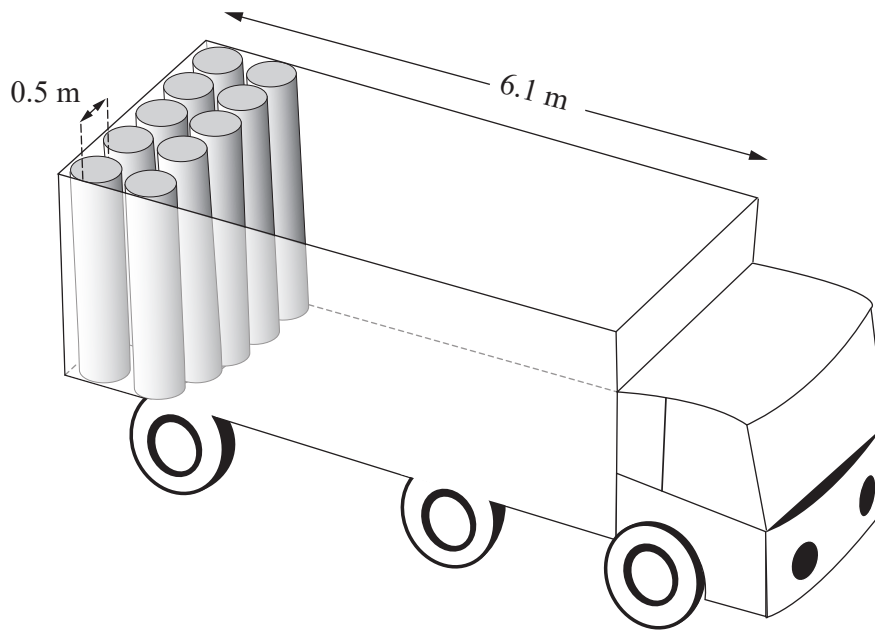d) Write the mass in the empty cell of the scale. *[1 mark]*

Units | mg

Mass

Not to scale

QUESTION 4 (4 marks)

A truck transports gas cylinders in cages, as shown.

a) Estimate the maximum number of gas cylinders that would fit inside the truck.   *[2 marks]*

_____

_____

_____

_____

b) If each gas cylinder contains 200 L, estimate the maximum capacity the truck can
transport in litres.   *[1 mark]*

_____

_____

After a delivery, the truck has 25% of the gas cylinders left.

c) Use the result from Question 4b) to determine the amount of gas left on the truck in litres.   *[1 mark]*

_____

_____

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QUESTION 5 (5 marks)

A family donated shoes to a charity. The collection of different shoe sizes is shown.

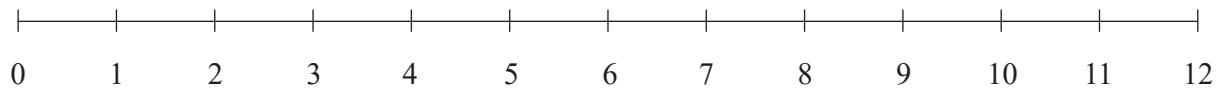| 2	2	2	3	3	4	4	4	4	6	7	8	9

a) Determine the modal shoe size. *[1 mark]*

b) Complete the five-number summary for the shoe sizes by writing an appropriate value in each empty cell of the table. *[2 marks]*

Minimum	Lower quartile (Q_1)	Median	Upper quartile (Q_3)	Maximum
	2.5		6.5	

c) Construct a box plot to represent the data. *[2 marks]*

Draw your box plot here.

0   1   2   3   4   5   6   7   8   9   10   11   12

Note: If you make a mistake in the box plot, cancel it by ruling a single diagonal line through your work and use the additional response space at the back of this question and response book.

QUESTION 6 (6 marks)

A fountain collects water in a sphere that then flows via three tubes into a cylindrical pool, as shown. The radius of the sphere and the cylinder are the same.

Not to scale
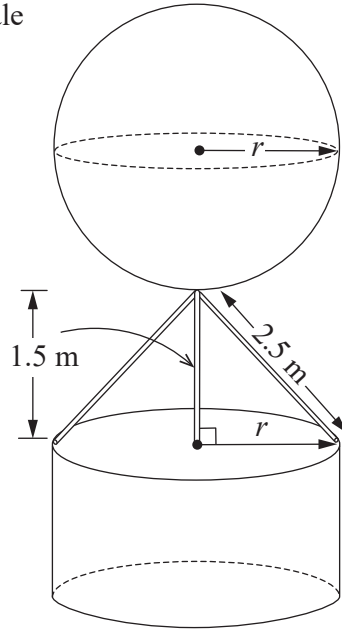
a) Use Pythagoras' theorem to calculate the radius, r, of the cylinder in metres.   *[2 marks]*

_____

_____

_____

_____

b) Use the result from Question 6a) to calculate the volume of the sphere in cubic metres.   *[2 marks]*

_____

_____

_____

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c) Use the result from Question 6b) to determine the capacity of the sphere in litres. *[1 mark]*

d) Use the result from Question 6c) to determine the number of times a 12 600 L cylinder can be filled with water from the sphere. *[1 mark]*

QUESTION 7 (3 marks)

Liquid soap is stored in a bottle with a volume of 177 000 mm^3.

a) Convert the volume of the bottle to cubic centimetres. *[1 mark]*

b) Use the result from Question 7a) and leading-digit approximation to estimate the number of times people can wash their hands using all the soap from the bottle, given that on average people use 3.7 cm^3 of soap per hand wash. *[1 mark]*

c) Use the result from Question 7b) and leading-digit approximation to estimate the total mass of the soap, excluding the bottle, if each hand wash uses 3 g of soap. *[1 mark]*

QUESTION 8 (3 marks)

The owner of a gym wants to work out the size of a trampoline. The floor of the gym is covered in square mats, with each square mat occupying an area of 10 000 cm^2, as shown.
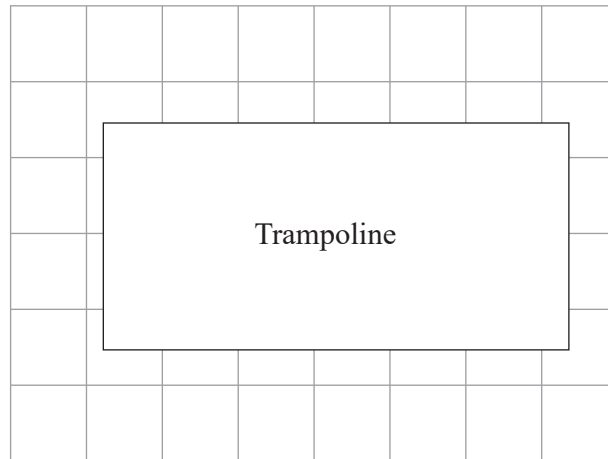
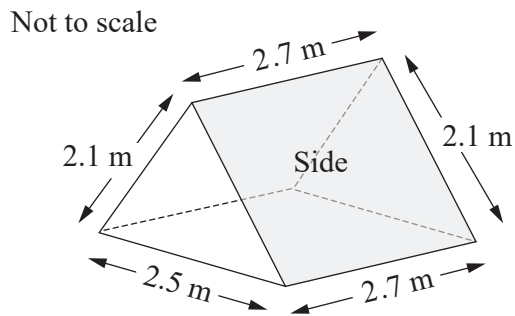a)   Convert the area of one square mat into the most appropriate unit of measure.   *[2 marks]*

_____

_____

_____

b)   Use the result from Question 8a) to estimate the width of the trampoline in metres.   *[1 mark]*

_____

QUESTION 9 (5 marks)

A camper sets up their tent as shown.

Not to scale

2.7 m

2.1 m

Side

2.1 m

2.5 m

2.7 m

a) Identify the name of the three-dimensional shape. *[1 mark]*

b) How many edges does the tent have? *[1 mark]*

c) Identify the shape of the side face. *[1 mark]*

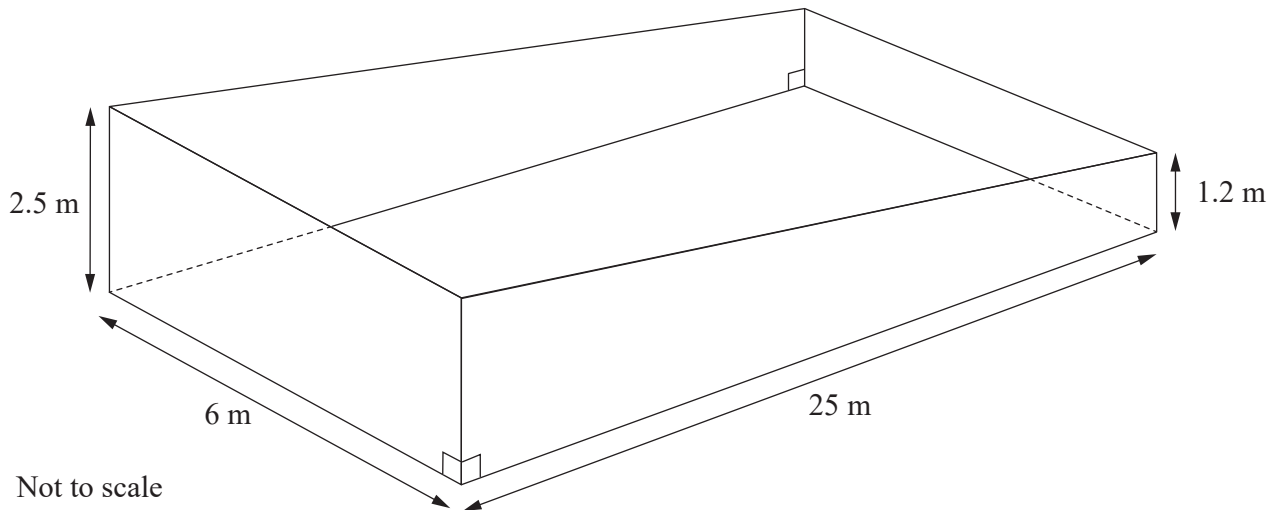d) Calculate the area of the side face in square metres. *[2 marks]*

Part B: Complex

• This part has two questions and is worth 10 marks.

QUESTION 10 (5 marks)

The school pool shown needs its internal walls and base repainted.

2.5 m

1.2 m

6 m

25 m

Not to scale

a) Calculate the total surface area of the pool to be repainted in square metres. *[4 marks]*

The school has enough paint to cover a maximum surface area of 110 m^2.

b) Use the result from Question 10a) to evaluate whether the school has enough paint to cover the internal walls and base of the pool. *[1 mark]*
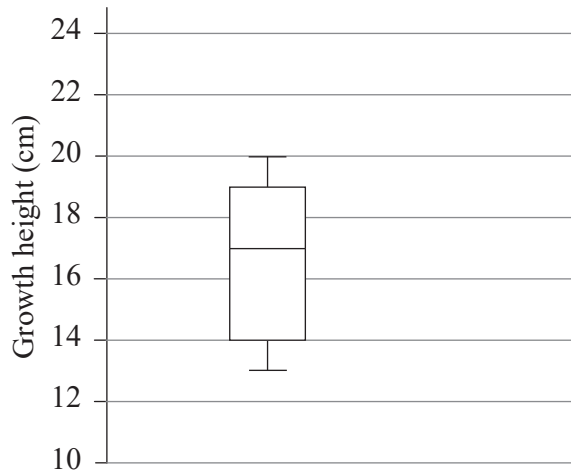
QUESTION 11 (5 marks)

Dee had a competition with a neighbour to see who was the better gardener. They both planted the same seedlings and recorded their growth heights over a set period of time.

The growth heights of Dee's seedlings in centimetres are shown.

| 14 | 14 | 10 | 21 | 23 | 15 | 11 | 19 | 12 | 12 | 16 |

The growth heights of the neighbour's seedlings are represented as a box plot.

Dee grew the tallest plant, while the neighbour had more consistent growth heights. Both claim they are the better gardener. Evaluate the reasonableness of their claims and decide who was the better gardener. Justify your decision using mathematical reasoning.

END OF PAPER

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ADDITIONAL PAGE FOR STUDENT RESPONSES

Write the question number you are responding to.

Do not write outside this box.

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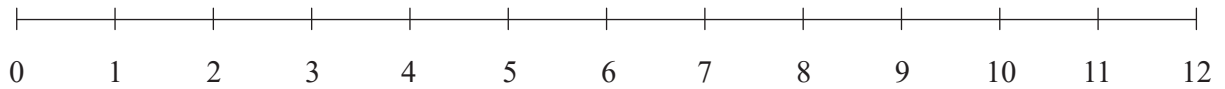
Write the question number you are responding to.

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Write the question number you are responding to.

Do not write outside this box.

If you want this box plot to be marked, rule a single diagonal line through your original response.

Draw your box plot here.

0	1	2	3	4	5	6	7	8	9	10	11	12

Instrument-specific standards — Common internal assessment

Foundational knowledge and problem solving	Cut-off (marks)	Grades
The student work has the following characteristics		
• comprehensive selection, recall and use of simple and complex facts, rules, definitions and procedures; comprehension and clear communication of simple and complex mathematical concepts and techniques; evaluation of the reasonableness of solutions and use of mathematical reasoning to justify procedures and decisions; and proficient application of simple and complex mathematical concepts and techniques to solve problems	> 40	A
• selection, recall and use of simple and some complex facts, rules, definitions and procedures; comprehension and communication of simple and some complex mathematical concepts and techniques; evaluation of the reasonableness of some solutions using mathematical reasoning; and application of simple and some complex mathematical concepts and techniques to solve problems	> 30	B
• selection, recall and use of simple facts, rules, definitions and procedures; comprehension and communication of simple mathematical concepts and techniques; discussion of the reasonableness of solutions using mathematical reasoning; and application of simple mathematical concepts and techniques to solve problems	> 20	C
• some selection, recall and use of facts, rules, definitions and procedures; basic comprehension and communication of mathematical concepts and techniques; some discussion of the reasonableness of solutions; and inconsistent application of mathematical concepts and techniques	> 10	D
• isolated and inaccurate selection, recall and use of facts, rules, definitions and procedures; disjointed and unclear communication of mathematical concepts and techniques; superficial discussion of the reasonableness of solutions.	≥ 0	E