Given name/s	
Family name	
Teacher	
Class	
School name	

Common internal assessment 2023 — Phase 4

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

Clear zone — margin trimmed off after completion of assessment

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

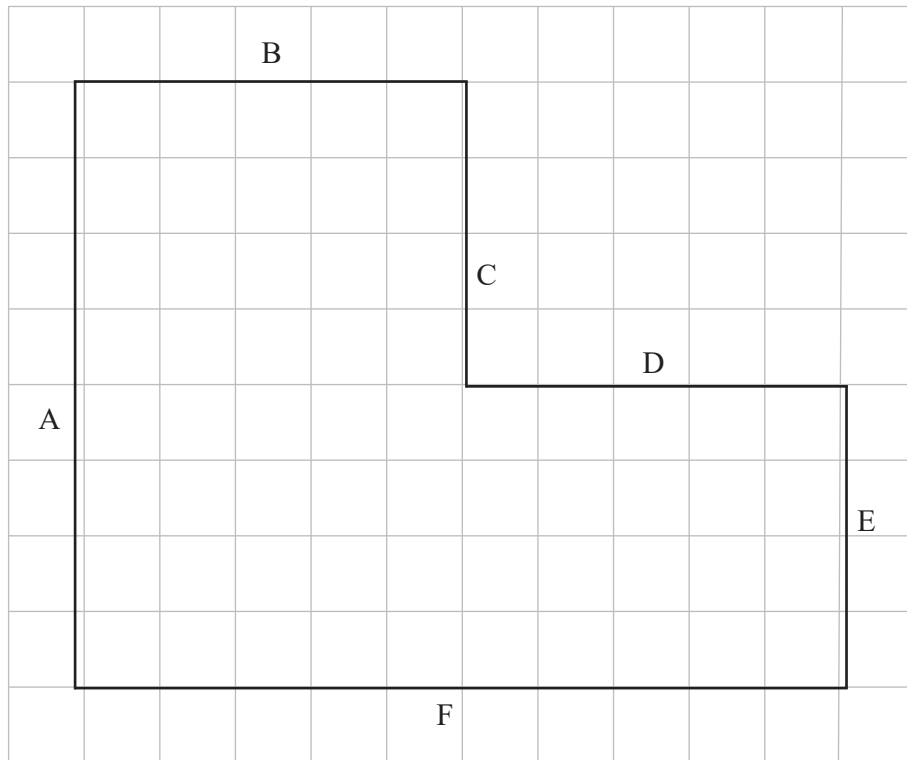- This part has nine questions and is worth 40 marks.

DO NOT WRITE ON THIS PAGE

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QUESTION 1 (3 marks)

The top view of a theatre is drawn on a grid as shown.

Scale 1 unit : 100 cm

a) Estimate the actual length of side F in centimetres. *[2 marks]*

_____

_____

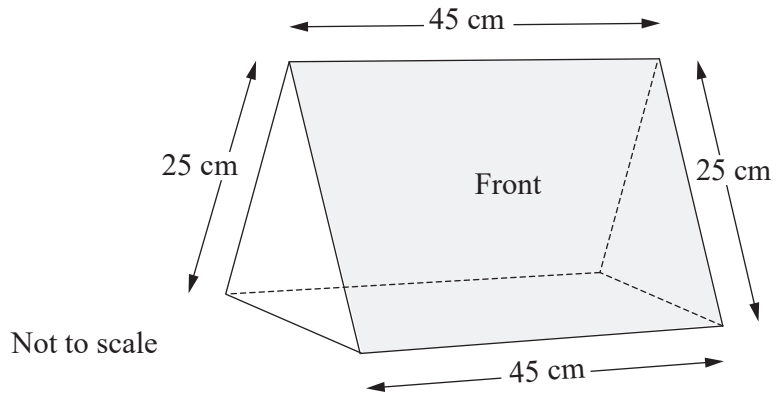The area of the theatre is approximately 620 000 cm^2.

b) Convert the area into the most appropriate unit of measure. *[1 mark]*

_____

_____

QUESTION 2 (5 marks)

A baker is creating a cake in the shape shown.

45 cm

25 cm   Front   25 cm

Not to scale

45 cm

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

_____

_____

b) How many vertices does the cake have?   *[1 mark]*

_____

An edible photograph will be placed on the front face of the cake.

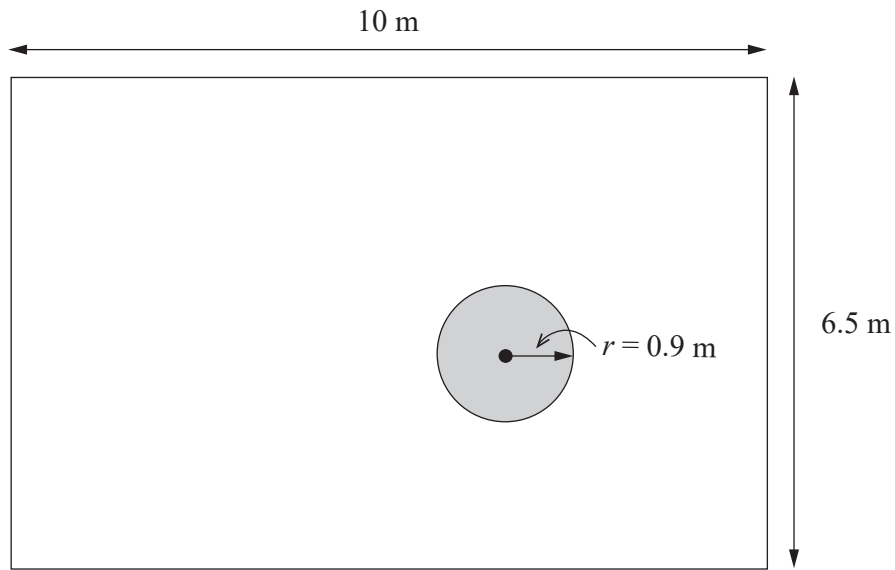c) Identify the shape of the front face.   *[1 mark]*

_____

_____

d) Calculate the area of the front face in square centimetres.   *[2 marks]*

_____

_____

_____

QUESTION 3 (4 marks)

A worker blocked off a rectangular section of road with a barrier to inspect the condition of a sinkhole, as shown in the top view.
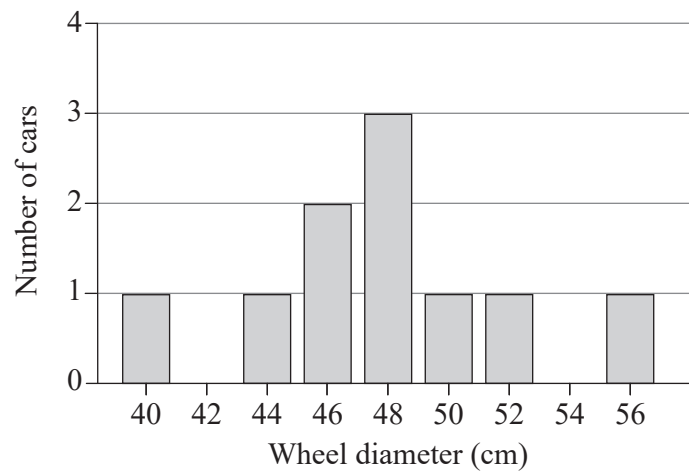
10 m

$r = 0.9$ m

6.5 m

Not to scale

a) Calculate the perimeter of the blocked off section in metres. *[2 marks]*

b) Use leading-digit approximation to estimate the area of the sinkhole in square metres. *[2 marks]*

QUESTION 4 (5 marks)

The wheel diameters of 10 different cars are recorded as shown.

a) Calculate the mean wheel diameter. *[2 marks]*

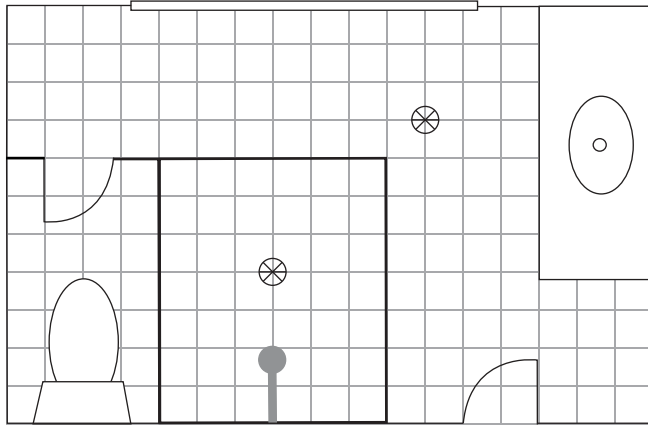b) Determine the median wheel diameter. *[2 marks]*

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

QUESTION 5 (5 marks)

The building plan for a bathroom renovation is shown.

Key	
Symbol	Feature
⊗	Drain
⊙	Basin
	Toilet
•—	Showerhead
—	Window
	Door

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

_____

b) The plan will be labelled with a scale 10 mm : 50 cm. Interpret what this scale means.   *[1 mark]*

_____

_____

_____

The dimensions of the shower on the plan are 35 mm × 30 mm.

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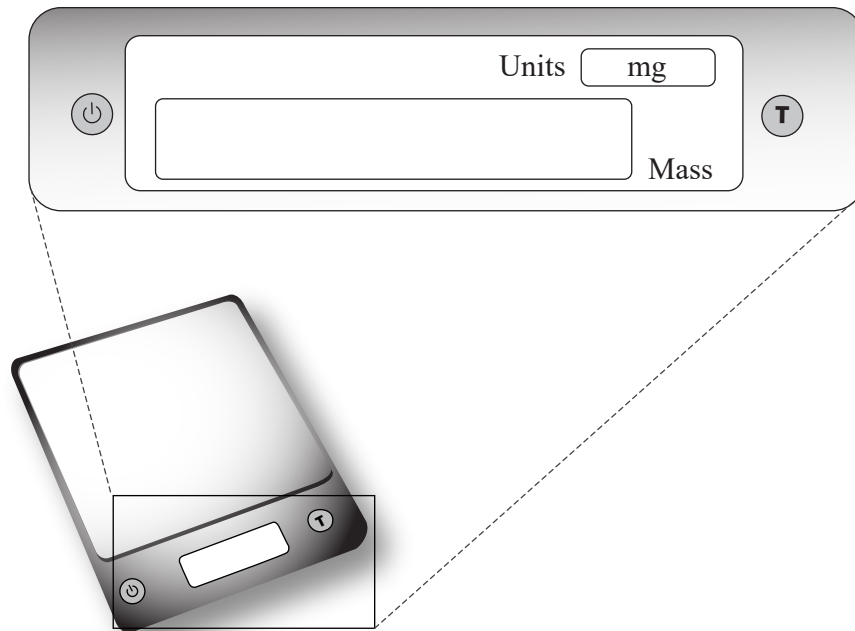
_____

_____

_____

_____

A contractor asks the construction company to mail them the building plan, which was weighed at 0.014 g.

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

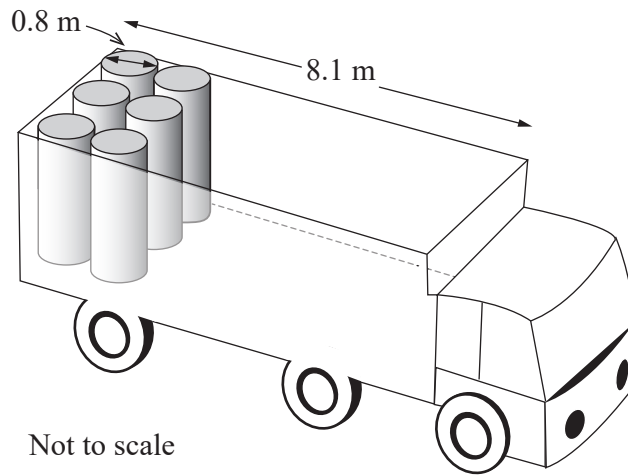d) Write the mass in the empty cell of the scale. *[1 mark]*

Units [mg]

Mass

Not to scale

QUESTION 6 (4 marks)

A truck carries a chemical in cylindrical barrels, as shown.

Not to scale

a) Estimate the maximum number of barrels that would fit inside the truck.

[2 marks]

b) If each barrel has a capacity of 600 L, estimate the maximum capacity of the truck in litres.

[1 mark]

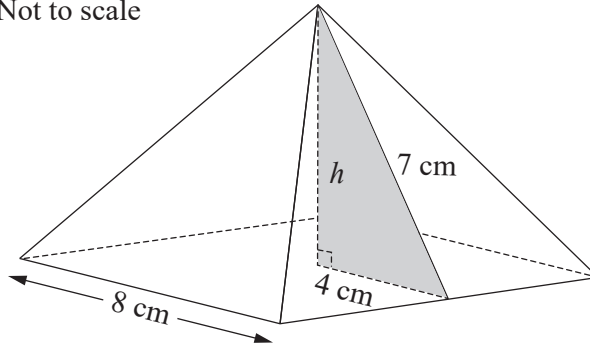After a delivery, the truck has 40% of the barrels left.

c) Use the result from Question 6b) to determine the amount of chemical left on the truck in litres.

[1 mark]

QUESTION 7 (6 marks)

A plastic paperweight is in the shape of a square-based pyramid, as shown.

Not to scale

a) Use Pythagoras' theorem to calculate the height, h, of the paperweight in centimetres.   *[2 marks]*

b) Use the result from Question 7a) to calculate the volume of the paperweight in cubic centimetres.   *[2 marks]*

c) To make the plastic paperweight, a liquid is poured into a mould. Use the result from Question 7b) to determine the capacity of the paperweight mould in litres.   *[1 mark]*

d) Use the result from Question 7c) to determine the number of plastic paperweights that can be made from 10 L of liquid.   *[1 mark]*

Do not write outside this box.

QUESTION 8 (3 marks)

A person is moving containers completely filled with glue. The largest container has a torn label and now only shows the volume.
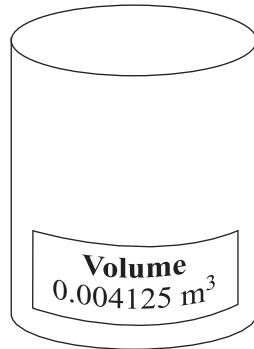
Volume
0.004125 m^3

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

_____

_____

b) Use the result from Question 8a) and leading-digit approximation to estimate the number of times the largest container can be filled using a smaller container, which has a volume of 1150 cm^3. *[1 mark]*

_____

_____

c) Use the result from Question 8b) and leading-digit approximation to estimate the mass of the largest container in kilograms, given the smaller container weighs 7.8 kg. *[1 mark]*

_____

_____

Do not write outside this box.

QUESTION 9 (5 marks)

Scientists collected data on lizard lengths, in centimetres, as shown.

| 12 | 13 | 14 | 15 | 16 | 17 | 19 | 21 | 22 | 24 | 27 | 27 | 29 | 30 | 32 | 33 | 53 |

a) Determine the modal lizard length. *[1 mark]*

b) Complete the five-number summary for the lizard lengths 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
	15.5		29.5	

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

Draw your box plot here.

10   15   20   25   30   35   40   45   50   55   60   65   70
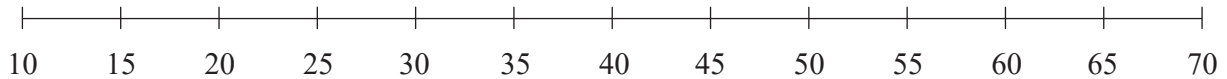
Note: If you make a mistake in the box plot, cancel it by ruling a single diagonal line through your work
and use the additional response space at the back of this question and response book.

Part B: Complex

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

QUESTION 10 (5 marks)

A model of an observatory is made of two three-dimensional shapes (a cylinder and a hemisphere), as shown.

15 cm

25 cm

Not to scale

a) Calculate the total outer surface area of metal needed to construct the model of an observatory in square centimetres.

[4 marks]

The amount of metal available is 5000 cm^2.

b) Use the result from Question 10a) to evaluate whether there is enough metal to make
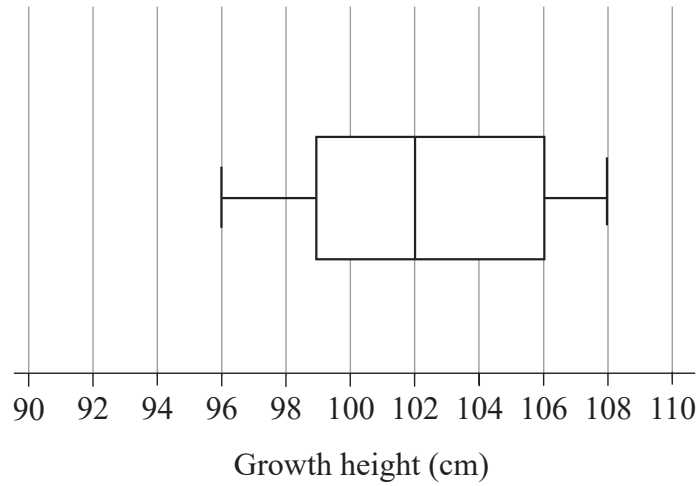the model of an observatory. *[1 mark]*

QUESTION 11 (5 marks)

Sharnee is comparing two kinds of potting mix for a sunflower garden. The best potting mix will produce the tallest flowers.

The growth heights of sunflowers using potting mix A are represented in a box plot.

Growth height (cm)

The growth heights (cm) of sunflowers using potting mix B are shown.

| 108	105	98	105	99	98	97	98	104	96	100

Sharnee believes that potting mix A is best for growing the tallest sunflowers. Evaluate the reasonableness of this belief. Justify your decision using mathematical reasoning.

_____

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END OF PAPER

ADDITIONAL PAGE FOR STUDENT RESPONSES

Write the question number you are responding to.

Do not write outside this box.

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

Draw your box plot here.

10	15	20	25	30	35	40	45	50	55	60	65	70
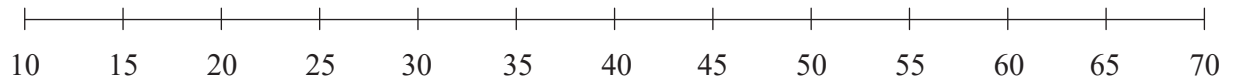
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Instrument-specific standards — Common internal assessment

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; comprehension and communication 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