Common internal assessment 2020 — Single phase

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 sheet 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

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 section has nine questions and is worth 40 marks.

QUESTION 1 (2 marks)

A milk container has the three-dimensional shape shown.
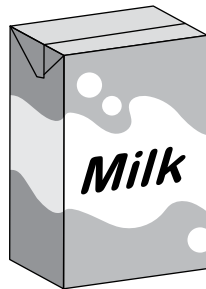
Not drawn to scale

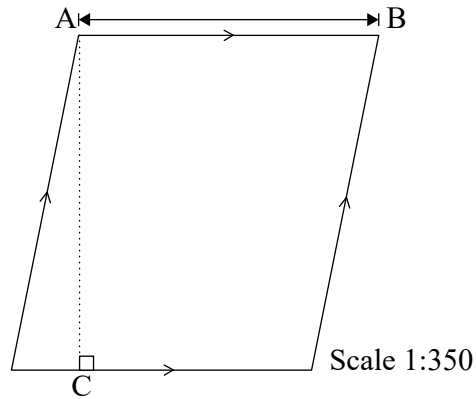a) How many edges does this milk container have? *[1 mark]*

b) How many faces does this milk container have? *[1 mark]*

QUESTION 2 (6 marks)

A scale drawing of a block of land in the shape of a parallelogram is shown.

Scale 1:350

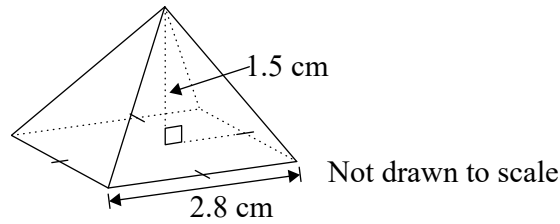a) Determine the actual length of the side labelled AB in metres (m). *[2 marks]*

_____

_____

_____

_____

b) Determine the actual length of the line labelled AC in metres (m). *[2 marks]*

_____

_____

_____

_____

c) Calculate the actual area of the block of land, rounded to the nearest square metre (m²). *[2 marks]*

_____

_____

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_____

QUESTION 3 (6 marks)

Chocolates are made by pouring liquid chocolate into a mould in the shape of the square-based pyramid shown.

The mould has a perpendicular height of 1.5 centimetres (cm) and base length of 2.8 centimetres (cm).

a) Calculate the volume of liquid chocolate required to fill one mould in cubic centimetres (cm³). *[2 marks]*

b) Use the result from 3a) to determine the capacity of one mould in millilitres (mL). *[1 mark]*
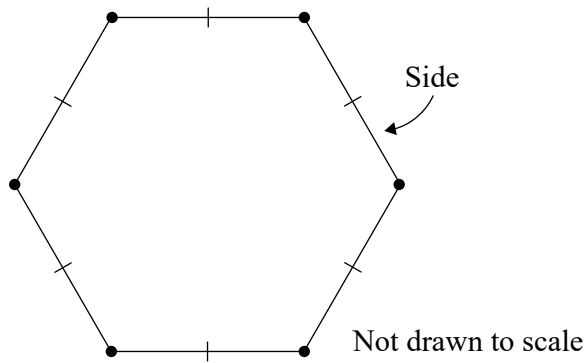
One litre (L) of liquid chocolate is available.

c) Determine how many millilitres (mL) of liquid chocolate are available. *[1 mark]*

d) Determine the maximum number of moulds that can be filled using the 1 litre (L) of liquid chocolate available. *[2 marks]*

QUESTION 4 (3 marks)

A dog takes 60 steps to walk the length of one side of the enclosure shown.

Side

Not drawn to scale

a) Calculate the number of steps the dog takes to walk the perimeter of the enclosure.   *[1 mark]*
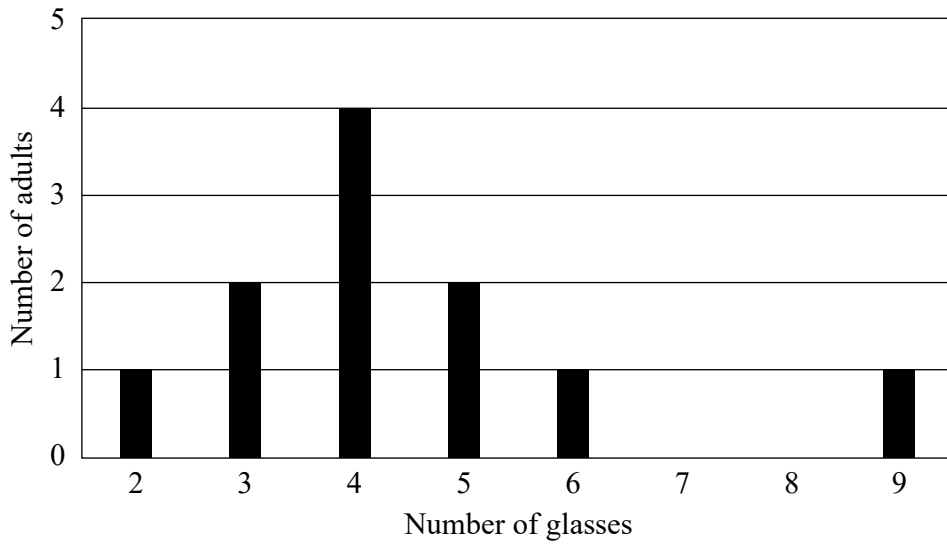
_____

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The dog has an average step length of 85 centimetres (cm).

b) Use the result from 4a) to calculate the perimeter of the enclosure in metres (m).   *[2 marks]*

_____

_____

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_____

QUESTION 5 (6 marks)

A survey recorded the number of glasses of water consumed by adults in 24 hours. The results from 11 adults are shown in the graph.

a) Identify the modal number of glasses of water consumed.   *[1 mark]*

_____

b) List the 11 survey results in order.   *[1 mark]*

_____

c) Determine the median number of glasses of water consumed.   *[1 mark]*

_____

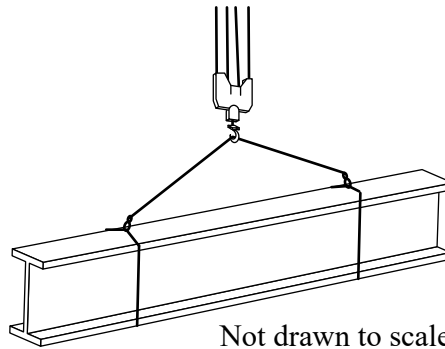d) Calculate the mean number of glasses of water consumed.   *[2 marks]*

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_____

e) Describe the spread of the data. *[1 mark]*

QUESTION 6 (4 marks)

Steel beams are used in many building structures.

Not drawn to scale

A 1-metre (m) length of steel beam has a mass of 14 kilograms (kg).

a) Calculate the mass of a 9-metre (m) length of steel beam in kilograms (kg). *[1 mark]*

A truck can carry a maximum mass of 2 tonnes (t).

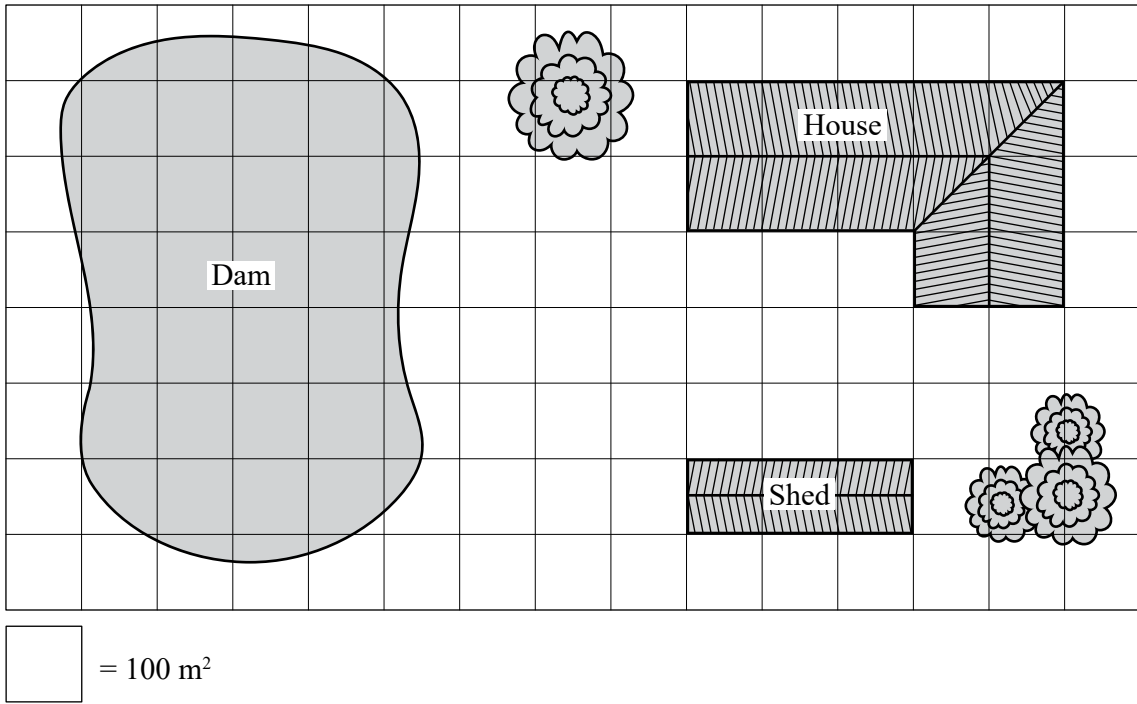b) Convert 2 tonnes (t) to kilograms (kg). *[1 mark]*

c) Use the result from 6a) to determine the maximum number of 9-metre (m) steel beams the truck can carry. *[2 marks]*

QUESTION 7 (4 marks)

The position of a dam and two buildings on a farm is shown in the diagram.

= 100 m²

a) Determine the actual area of the shed in square metres (m²). *[1 mark]*

b) Estimate the actual area of the dam in square metres (m²). *[1 mark]*

c) Determine the actual area of the entire farm in hectares (ha). *[2 marks]*
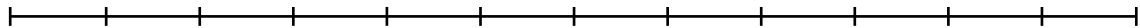
QUESTION 8 (5 marks)

A customer regularly purchases drinks in a 600-millilitre (mL) cup from a takeaway shop. The data shows the actual volume of nine of the drinks in millilitres (mL).

Volume (mL)	580	597	592	573	550	568	556	545	582

Use a five-number summary to construct a box plot for this data.
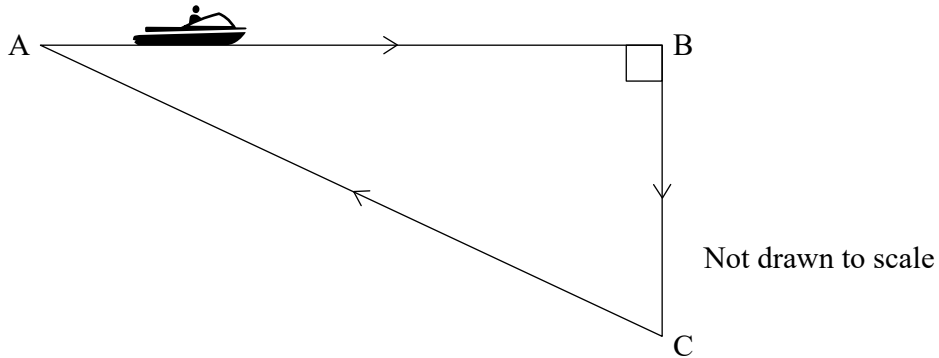
Draw your box plot here.

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 space on page 18 of this question and response book.

QUESTION 9 (4 marks)

The diagram shows the round trip to be travelled by a boat, starting and ending at A.

A ———————————→ B

C

Not drawn to scale

The boat will travel 60 kilometres (km) in a straight line from A to B, then 32 kilometres (km) in a straight line from B to C.

a) Use Pythagoras' theorem to calculate the straight-line distance from C to A in kilometres (km).

[2 marks]

The boat has enough fuel to travel 150 kilometres (km).

b) Use the result from 9a) to determine if the boat has enough fuel to complete the round trip.

[2 marks]

Part B: complex

- This section has two questions and is worth 10 marks.

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QUESTION 10 (5 marks)

The concert stage shown in the scale drawing is to be painted.

Concert stage

Scale 1:120
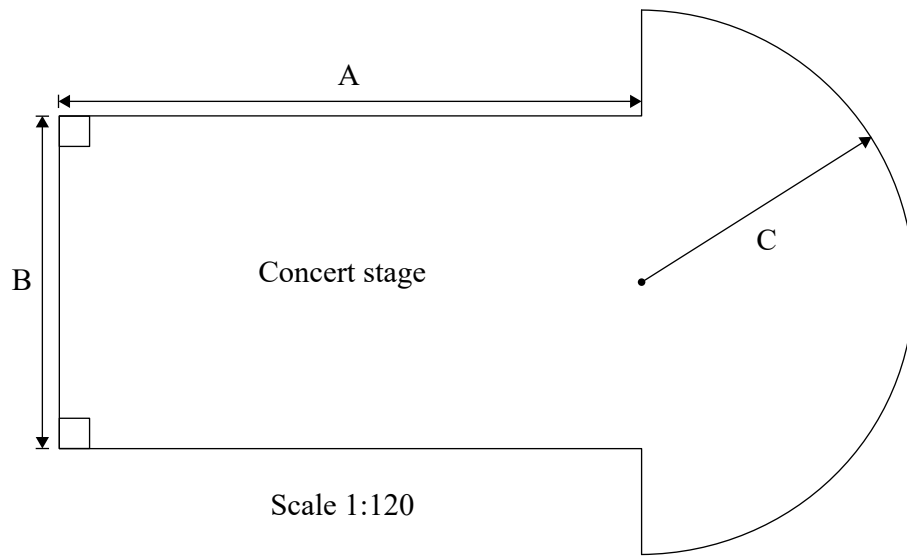
a) Determine the actual lengths of A, B and C in metres (m). *[2 marks]*

b) One tin of paint can coat an area of 20 square metres (m²). Determine if four tins of paint are enough to coat the concert stage. *[3 marks]*

QUESTION 11 (5 marks)

The heights of a sample of pine trees growing in two plantations were measured in metres (m).
The results are shown.

Plantation A		Plantation B
	0	9
4 2	1	1
5	1	7 7 8 9
4 3 2	2	4
9 9 7 5	2	5 5 6
6	3	1

$1|2 = 12$ metres (m)

It is claimed that the heights of the pine trees in Plantation A are smaller on average and less varied than the heights of the pine trees in Plantation B.

Use a measure of central tendency and a measure of spread to draw a conclusion about this claim.

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ADDITIONAL PAGE FOR STUDENT RESPONSES

Write the question number you are responding to.

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ADDITIONAL RESPONSE SPACE FOR QUESTION 8

If you want this box plot to be marked, rule a diagonal line through the box provided on page 8.

Draw your box plot here.