LUI | | | | | | | | | | |  School code | | | | |

School name

Given name/s

Family name

Attach your barcode ID label here

Book  of  books used

External assessment 2022

**Question and response book**

# General Mathematics

## Paper 1

**Time allowed**

- Perusal time — 5 minutes
- Working time — 90 minutes

**General instructions**

- Answer all questions in this question and response book.
- QCAA-approved scientific calculator permitted.
- QCAA formula book provided.
- Planning paper will not be marked.

**Section 1 (15 marks)**

- 15 multiple choice questions

**Section 2 (42 marks)**

- 10 short response questions

Clear zone — margin trimmed off after completion of assessment

Queensland Government | QCAA Queensland Curriculum & Assessment Authority

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# Section 1

## Instructions

- Choose the best answer for Questions 1–15.
- This section has 15 questions and is worth 15 marks.
- Use a 2B pencil to fill in the A, B, C or D answer bubble completely.
- If you change your mind or make a mistake, use an eraser to remove your response and fill in the new answer bubble completely.

| | A | B | C | D |
|---|---|---|---|---|
| Example: | ● | ○ | ○ | ○ |

| | A | B | C | D |
|---|---|---|---|---|
| **1.** | ○ | ○ | ○ | ○ |
| **2.** | ○ | ○ | ○ | ○ |
| **3.** | ○ | ○ | ○ | ○ |
| **4.** | ○ | ○ | ○ | ○ |
| **5.** | ○ | ○ | ○ | ○ |
| **6.** | ○ | ○ | ○ | ○ |
| **7.** | ○ | ○ | ○ | ○ |
| **8.** | ○ | ○ | ○ | ○ |
| **9.** | ○ | ○ | ○ | ○ |
| **10.** | ○ | ○ | ○ | ○ |
| **11.** | ○ | ○ | ○ | ○ |
| **12.** | ○ | ○ | ○ | ○ |
| **13.** | ○ | ○ | ○ | ○ |
| **14.** | ○ | ○ | ○ | ○ |
| **15.** | ○ | ○ | ○ | ○ |

Do not write outside this box.

## Section 2

### Instructions

- Write using black or blue pen.
- 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.
- This section has 10 questions and is worth 42 marks.

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## QUESTION 16 (3 marks)

The table shows the number of sales for a small business in their first six months of trading.

| Time in months, $t$ | Number of sales, $n$ |
|---|---|
| 1 | 86 |
| 2 | 180 |
| 3 | 160 |
| 4 | 226 |
| 5 | 240 |
| 6 | 335 |

a) Use your calculator to determine the equation of the least-squares line. *[1 mark]*

b) Use the equation from Question 16a) to predict the number of sales in the 21st month. *[2 marks]*

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## QUESTION 17 (4 marks)

An investment of \$50 000 that compounds interest monthly is modelled by the recurrence relation $A_{n+1} = 1.00375A_n$ where $A_0 = 50\,000$.

a) What would be the advertised interest rate per annum, compounding monthly? *[2 marks]*

b) How many months would it take for the value of the investment to exceed \$51 000? *[2 marks]*

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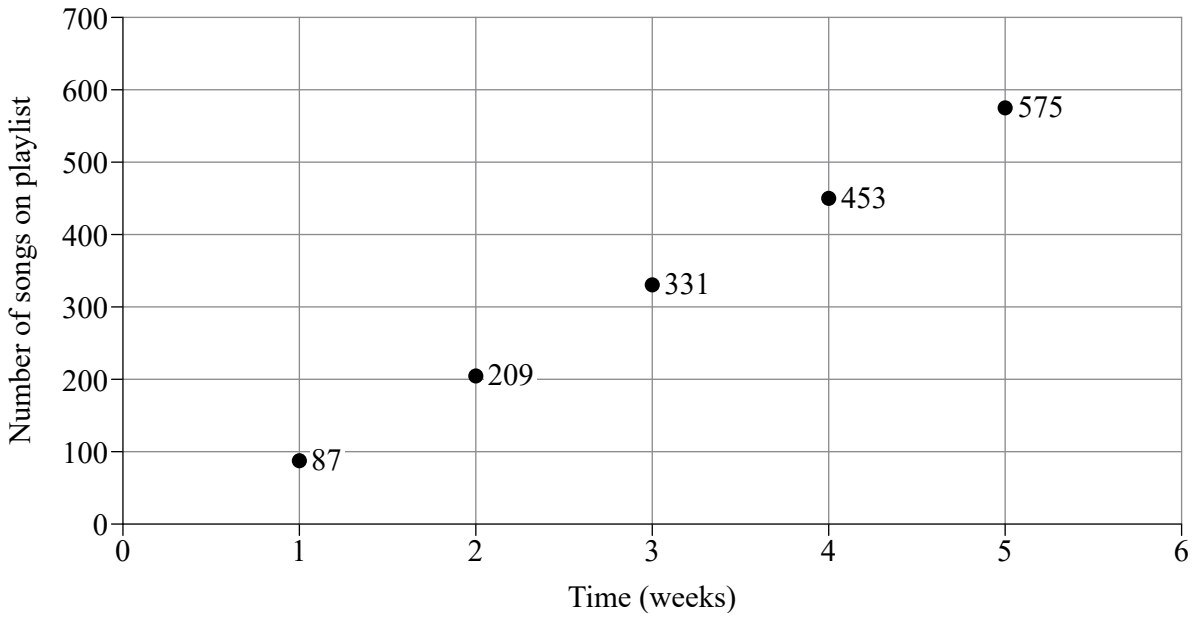
## QUESTION 18 (4 marks)

The number of songs on a person's playlist, $n$, in each week since joining a music streaming service, $t$, forms an arithmetic sequence, as shown by the graph.




Use the arithmetic sequence to predict the number of songs on this person's playlist 25 weeks after joining the streaming service.

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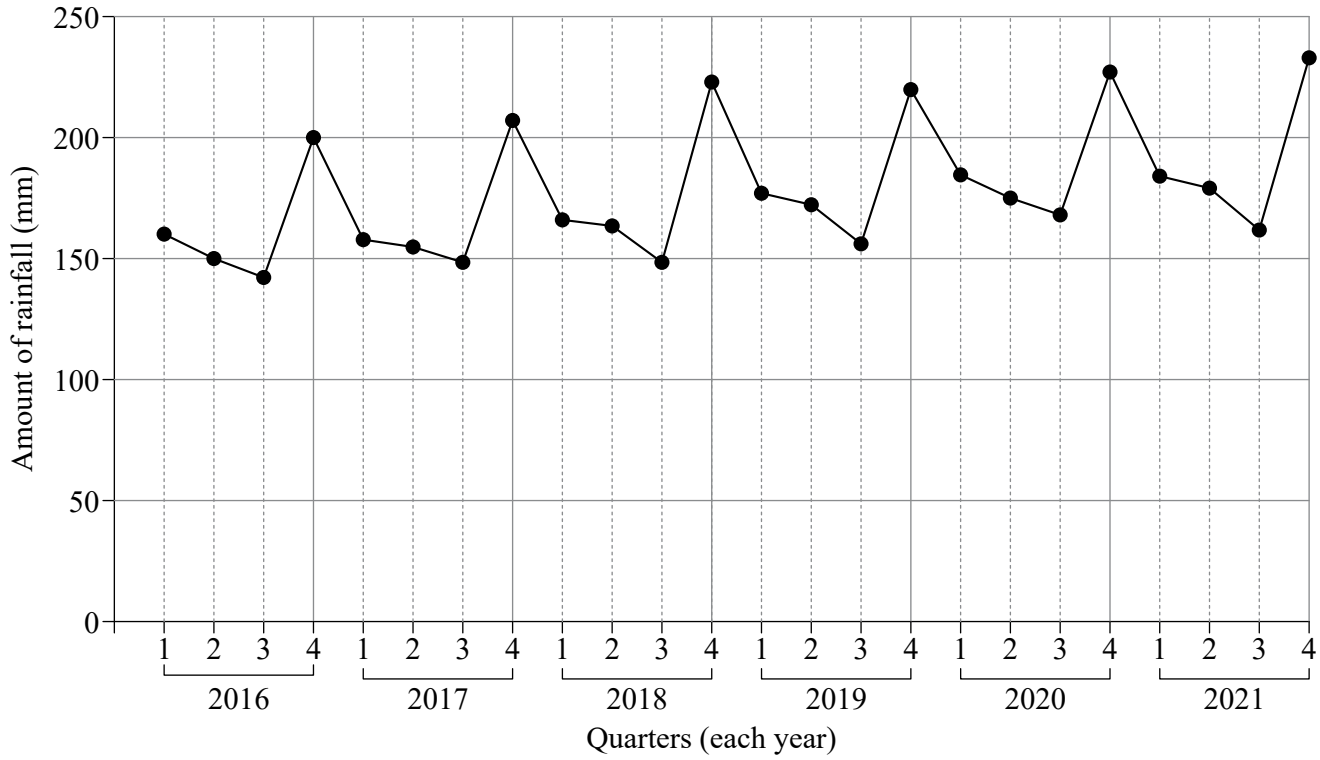
## QUESTION 19 (4 marks)

The graph shows the amount of rainfall (in mm) for each quarter from 2016 to 2021.




a) Describe the long-term trend and seasonality of the time series data. *[2 marks]*

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b) A least-squares line was fitted to the data, with $y$ representing the amount of rainfall and $x$ representing the number of quarters since the beginning of 2016 (e.g. $x = 5$ for the first quarter of 2017).

$$y = 1.763x + 156.5$$

Interpret the $y$-intercept and slope of the fitted line. *[2 marks]*

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## QUESTION 20 (4 marks)

The table summarises the distances in kilometres (km) between three flower stores and three delivery locations: A, B and C.

Use the Hungarian algorithm to determine the minimum total distance needed to deliver flowers to all locations if each store delivers flowers to only one location.

| | **A** | **B** | **C** |
|---|---|---|---|
| **Store 1** | 19 | 17 | 24 |
| **Store 2** | 15 | 14 | 22 |
| **Store 3** | 23 | 16 | 40 |

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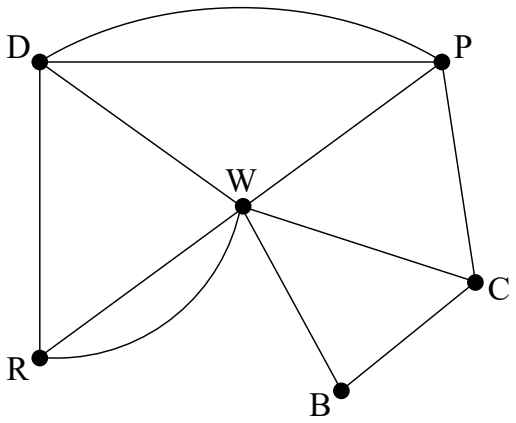
## QUESTION 21 (5 marks)

The paths connecting various landmarks in a park are shown.




**Key**

| | |
|---|---|
| B | Bus stop |
| C | Coffee shop |
| D | Duck pond |
| P | Playground |
| R | Rose garden |
| W | Water feature |

a) Identify one cycle that passes through the rose garden and the playground. *[1 mark]*

b) Identify whether the graph is Eulerian or semi-Eulerian. Justify your response. *[2 marks]*

c) Construct an adjacency matrix from the graph, using the vertex order listed in the key. *[2 marks]*

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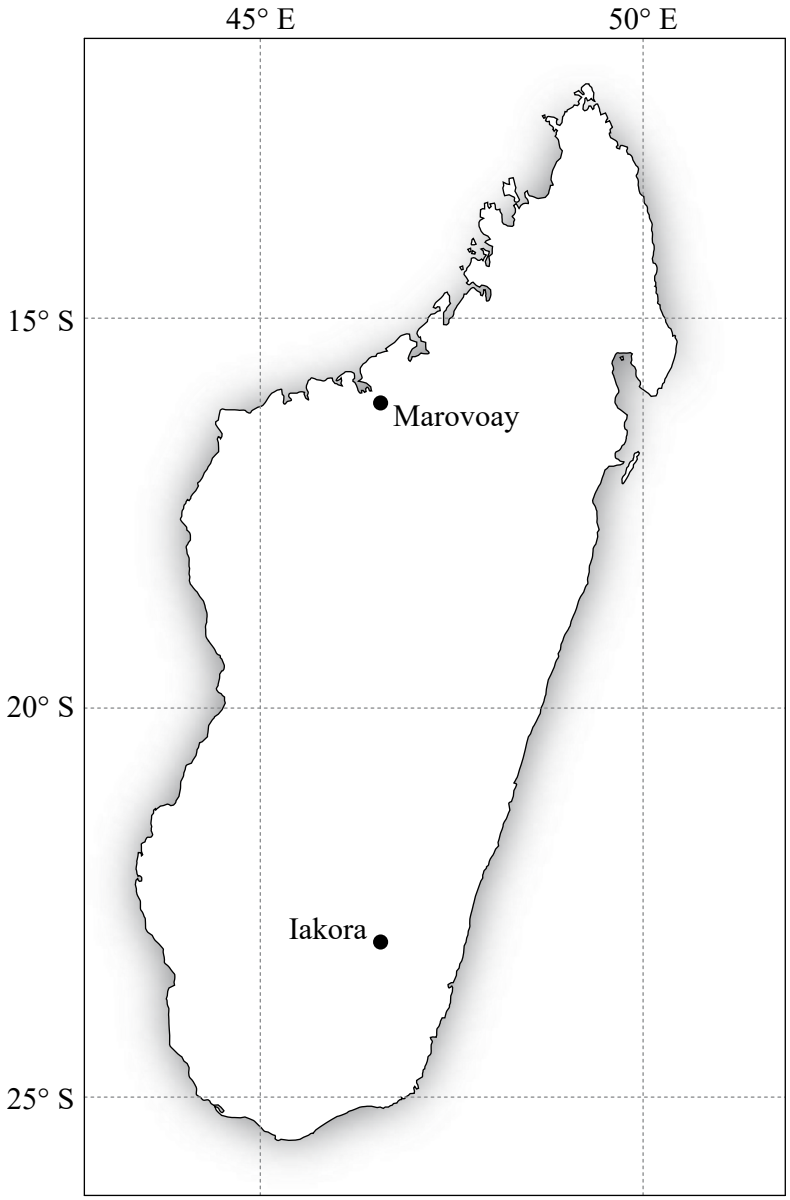
## QUESTION 22 (4 marks)

Marovoay and Iakora are located on the same meridian at 46.6° E, as shown on the map of Madagascar.




a) Determine the latitudes of Marovoay and Iakora. *[1 mark]*

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b) Use the result from Question 22a) to determine the shortest distance between Marovoay and Iakora. *[3 marks]*

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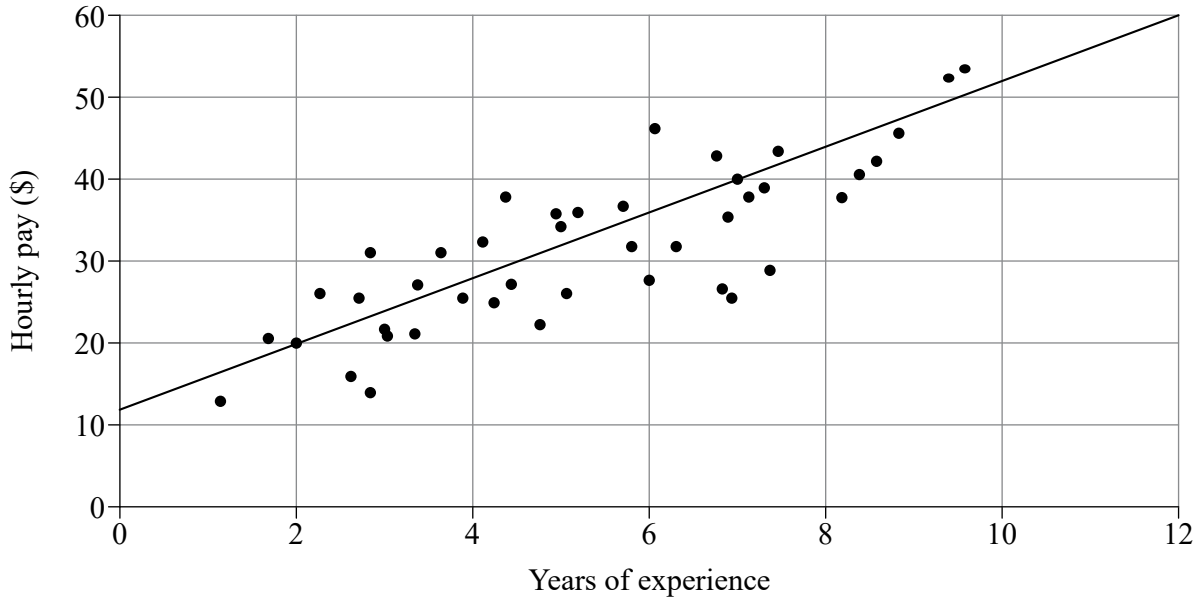
## QUESTION 23 (4 marks)

The least-squares line has been provided for a scatterplot that shows the association between an employee's years of experience, $n$, and their hourly pay, $p$.




a) Given that the least-squares line passes directly through the points (2, 20) and (7, 40), determine its equation. *[2 marks]*

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b) Use the equation from Question 23a) to predict the hourly pay of an employee with 15 years experience. *[2 marks]*

Do not write outside this box.

## QUESTION 24 (5 marks)

The maximum temperature and the number of pies sold each day at a bakery are provided in the table.

| **Maximum temperature (°C)** | 29 | 20 | 31 | 27 | 23 | 25 | 22 | 33 |
|---|---|---|---|---|---|---|---|---|
| **Number of pies sold** | 32 | 39 | 25 | 33 | 37 | 35 | 37 | 30 |

a) Construct a scatterplot to display the data on the grid provided. *[3 marks]*

**Note:** If you make a mistake in the scatterplot, 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.

b) Describe the association between the maximum temperature and the number of pies sold in terms of direction and strength. *[2 marks]*

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## QUESTION 25 (5 marks)

A couple borrow money to complete home renovations. Their bank has loaned the amount at 2.4% p.a. compounding monthly with repayments of $993.14 each month for 15 years.

a) Determine the amount of money borrowed. *[3 marks]*

b) Write a recurrence relation for the amount owing after $n$ months. *[2 marks]*

**END OF PAPER**

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## ADDITIONAL PAGE FOR STUDENT RESPONSES

Write the question number you are responding to.

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