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

School name

Given name/s

Family name

Attach your barcode ID label here

Book of books used

External assessment 2024

Question and response book

General Mathematics SEE

SEE 1

Time allowed

- Planning time — 15 minutes
- Working time — 180 minutes

General instructions

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

Section 1 (52 marks)

- 6 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

- 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.

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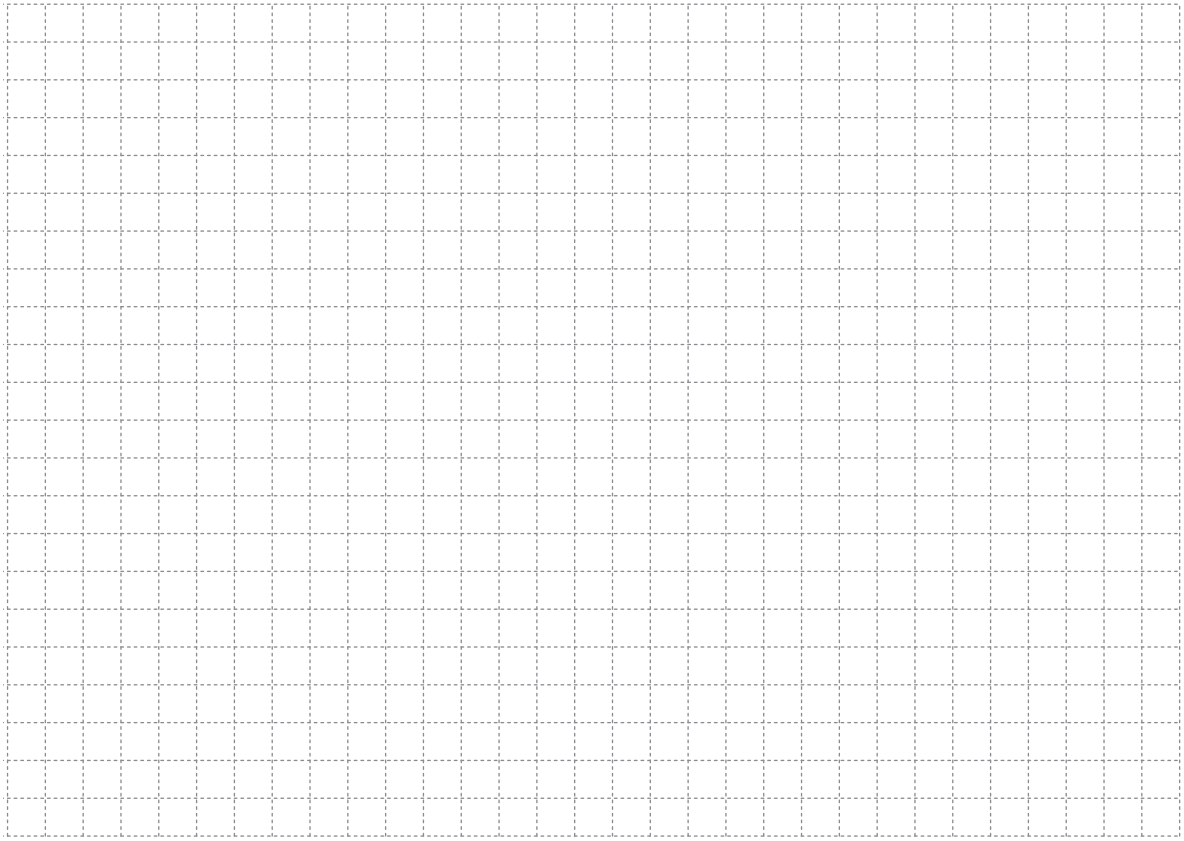
QUESTION 1 (4 marks)

a) Use Stimulus 1 in the stimulus book to construct a scatterplot of the koala density at Koala Coast. *[2 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) Use your scatterplot from Question 1a) to describe the association between the two variables in terms of direction and strength. *[2 marks]*

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QUESTION 2 (11 marks)

a) Use Stimulus 2 in the stimulus book to develop a linear model that can be used to predict koala density at Pine Rivers. *[3 marks]*

b) Use your linear equation from Question 2a) to predict Pine Rivers koala density at the beginning of 2014. *[3 marks]*

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c) The least-squares regression line for Koala Coast is $y = -2.011x + 55.875$, where x is the number of years since the beginning of 2000 and y is the predicted koala density. Use your linear model from Question 2a) to determine which region will have lower koala density at the beginning of 2025. *[5 marks]*

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QUESTION 3 (13 marks)

a) Use the data from Stimulus 1 and the least-squares regression line equation from Question 2c) to develop a residual plot for the Koala Coast model. *[5 marks]*

Koala Coast model: _____

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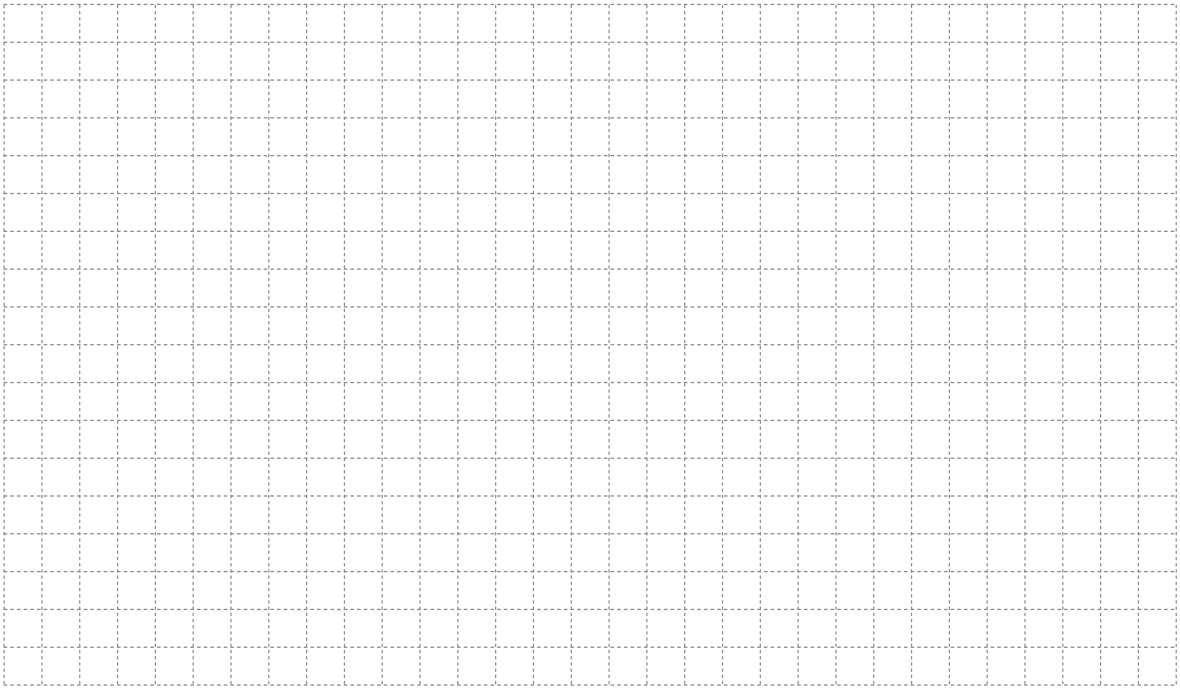

Note: If you make a mistake in the residual plot, cancel it by ruling a single diagonal line through your work and use the additional response space at the back of this question and response book.

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b) Use the data from Stimulus 2 and your linear equation from Question 2a) to develop a residual plot for the Pine Rivers model. *[5 marks]*

Pine Rivers model: _____

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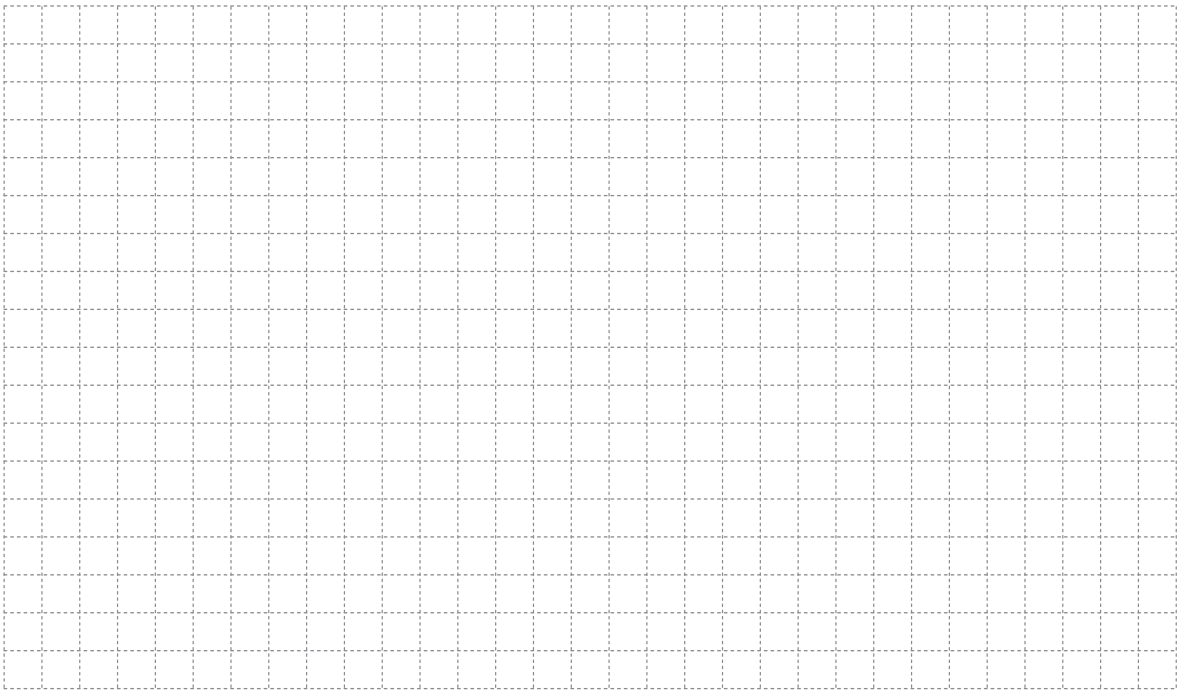

Note: If you make a mistake in the residual plot, cancel it by ruling a single diagonal line through your work and use the additional response space at the back of this question and response book.

c) Use your answers from Questions 3a) and 3b) to determine which region has the more appropriate linear model. *[3 marks]*

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QUESTION 4 (12 marks)

a) Use Stimulus 3 in the stimulus book to develop a geometric model that can be used to predict the total area of koala habitat zone in Queensland. The model must be developed using data points for 2016 and 2023. *[9 marks]*

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b) Use your geometric model from Question 4a) to determine the year the total area of koala habitat zone will exceed 800 000 hectares. Justify your response using mathematical reasoning. *[3 marks]*

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QUESTION 5 (5 marks)

It has been determined that planting more trees will improve koala density and restore koala numbers. A target has been set for planting an additional 110 hectares of koala habitat in Flinders Peak Conservation Park by 2032.

Flinders Peak Conservation Park contains 652 hectares of koala habitat in 2024. Eighteen hectares of koala habitat will be planted at the start of each year.

Use an arithmetic sequence, where t_n is the total hectares after n years and t_1 is the total hectares in 2024, to determine if the target will be met at the start of 2032.

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QUESTION 6 (7 marks)

You have been asked to determine the year when the koala populations in Koala Coast and Pine Rivers were the same.

Use your linear model for Pine Rivers from Question 2a) and the least-squares regression line for Koala Coast from Question 2c) to determine the year when the populations of koalas were the same.

The Koala Coast region is 235 000 hectares and the Pine Rivers region is 250 000 hectares.

Your response must include a graph of the koala populations. Use the grid provided over the page.

Evaluate the reasonableness of your solution using mathematical reasoning.

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Note: If you make a mistake in the graph, 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.

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ADDITIONAL PAGE FOR STUDENT RESPONSES

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