LUI | | | | | | | | | | |

School code | | | | |

School name

Given name/s

Family name

Attach your barcode ID label here

Book of books used

External assessment 2021

Question and response book

General Mathematics

Paper 2

Time allowed

- Perusal time — 5 minutes
- Working time — 90 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 (38 marks)

- 7 short response questions

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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 sailor anchors her yacht near Rocky Island at $14° \ 52' \ \text{S}, 145° \ 29' \ \text{E}$. Her yacht is at the same latitude as her home, but the sun rises exactly 1 hour and 13 minutes later at home.

What are the coordinates of her home?

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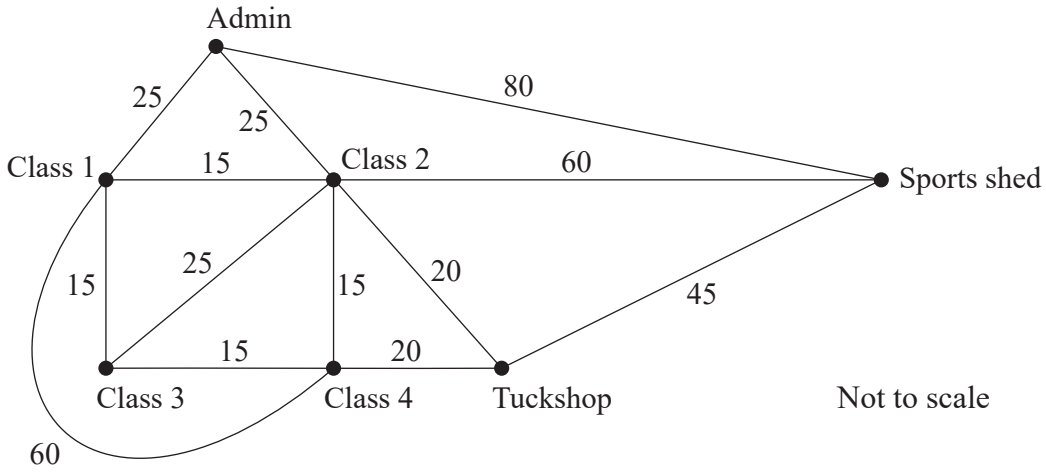
QUESTION 2 (4 marks)

All buildings in a school are connected by underground electricity cables, indicated by the network. All measurements are in metres.



The electricity cables need replacing and will cost $1200 per metre. The school wants to minimise costs by replacing the shortest length of cable necessary to connect all buildings.

If the school has a budget of $155 000, evaluate whether they can afford this project.

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QUESTION 3 (5 marks)

Jo contributes $2500 per quarter to an annuity earning 3.6% p.a. compounding quarterly.

At the end of 4 years, Jo makes a one-off extra contribution of $10 000 and continues with the regular quarterly contributions.

Determine the value of the annuity at the end of 6 years, to the nearest dollar.

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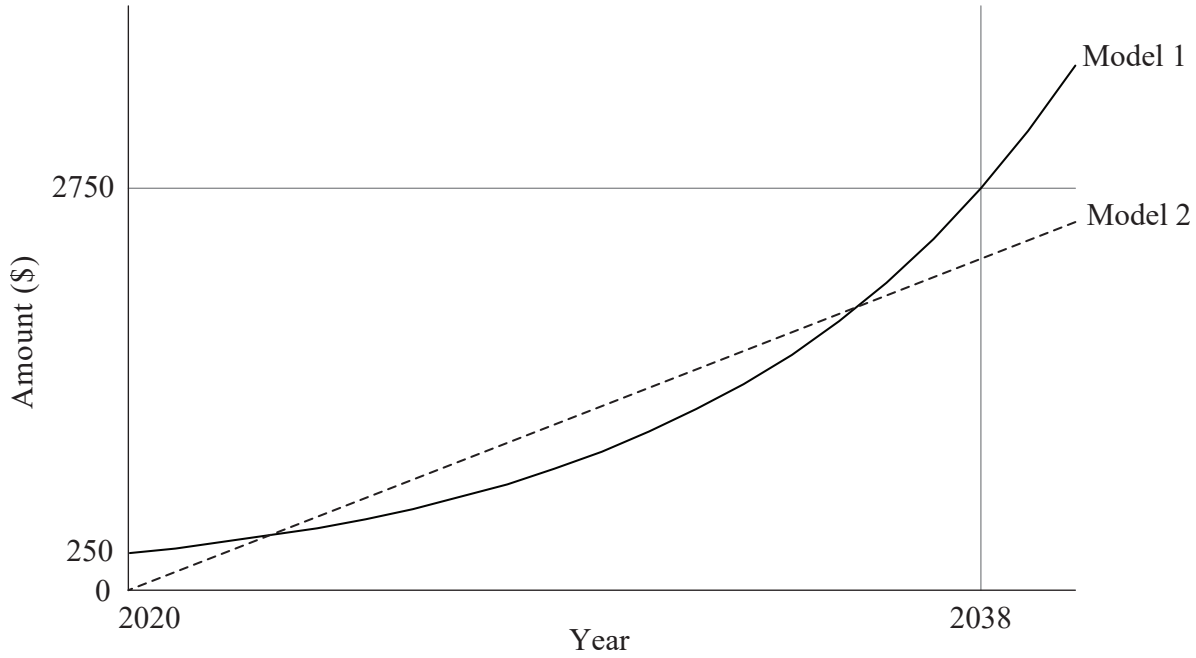
QUESTION 4 (6 marks)

The graph shows two investment models. Model 1 is compounding annually, while Model 2 increases linearly by $126 per year.



Determine the difference between the two investment strategies in 2030, to the nearest dollar.

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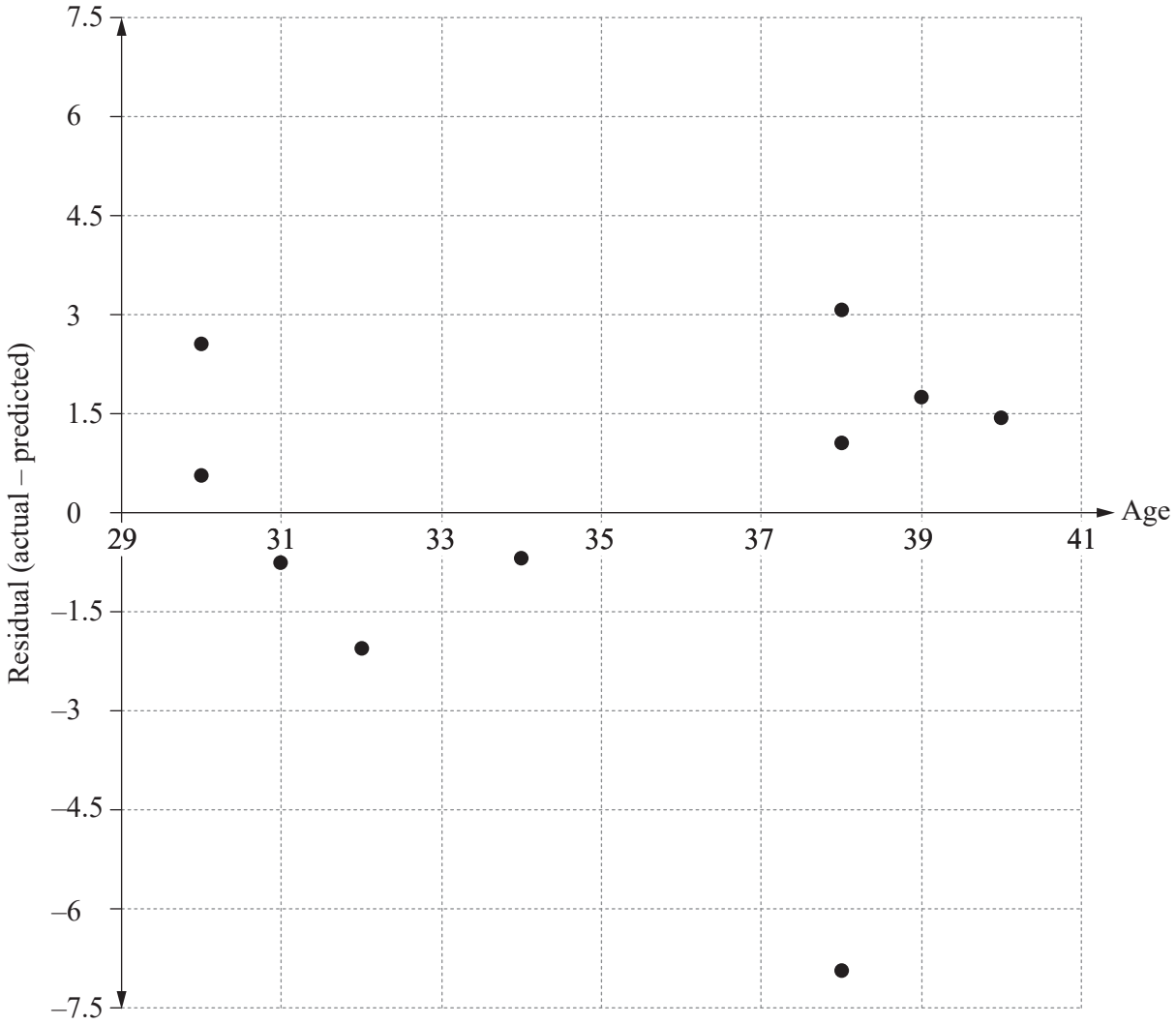
QUESTION 5 (6 marks)

Researchers gathered a set of data to determine if a model could reliably predict systolic blood pressure given a person's age. One candidate was 31 years old and had a systolic blood pressure of 119.

For this data, the correlation coefficient (r) is 0.875, the standard deviation for the person's age (s_x) is 4, and the standard deviation for the systolic blood pressure (s_y) is 6. A residual plot was produced for the model.



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Determine the actual systolic blood pressure, to the nearest whole number, for the oldest person in the sample (40 years old).

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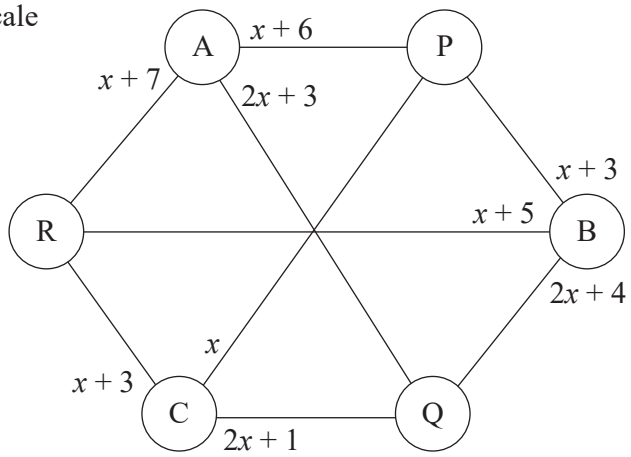
QUESTION 6 (7 marks)

A tow truck company has three tow trucks (A, B and C) and receives calls from three motorists (P, Q and R), who have broken down.

The network shows the distances in kilometres (km) from each of the tow trucks to each of the motorists, where x represents the distance between Tow Truck C and Motorist P.

Not to scale



The minimum total distance travelled by the three tow trucks in order for each tow truck to visit exactly one motorist is 32 km.

Use the Hungarian algorithm to determine the distance between Tow Truck C and Motorist P.

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QUESTION 7 (6 marks)

The table shows the total number of times a new song is played on a music service in the days following its first release.

Number of days since first release	5	10	15	20
Total number of times played ('000s)	8	12	18	27

The songwriter is paid 0.175 cents every time their song is played and will be paid after 60 days. They predict that by that time, they will be owed at least $1000.

Given that the number of times the song is played is increasing exponentially, evaluate the reasonableness of this prediction.

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ADDITIONAL PAGE FOR STUDENT RESPONSES

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