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

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

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Queensland Government | QCAA Queensland Curriculum & Assessment Authority

DO NOT WRITE ON THIS PAGE

THIS PAGE WILL NOT BE MARKED

Section 1

Instructions

- 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.
- Choose the best answer for Questions 1–15.
- 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.	○	○	○	○

Ensure you have filled an answer bubble for each question.

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.

QUESTION 16 (3 marks)

The number of seats in each row of a theatre forms the terms of the arithmetic sequence $t_{n+1} = t_n + 8$, where $t_1 = 25$.

a) How many seats are in the second row of the theatre? *[1 mark]*

b) Complete the table and then calculate the total number of seats in the first four rows of the theatre. *[2 marks]*

Row	1	2	3	4
Number of seats				

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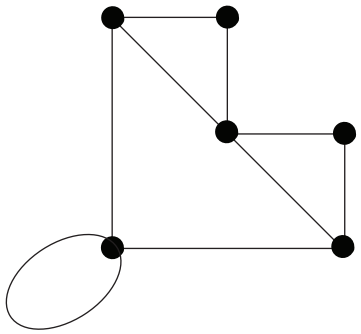
QUESTION 17 (4 marks)

A planar graph is shown.



a) Define *planar graph*. *[1 mark]*

b) How many faces does the graph have? *[1 mark]*

c) Show that Euler's formula works for the graph. *[2 marks]*

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QUESTION 18 (4 marks)

When a child is born, their parent deposits $3000 to open an investment account earning interest at 4.2% p.a. compounding monthly. If there are no further transactions and the interest rate does not change, calculate the amount of interest earned by the child's 18th birthday.

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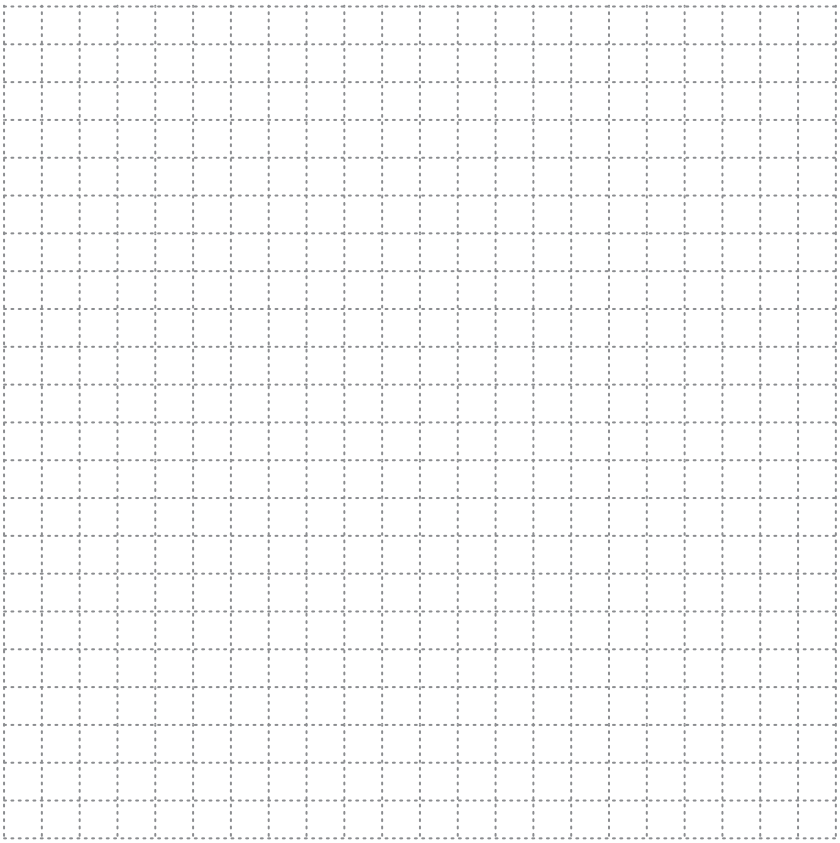
QUESTION 19 (4 marks)

The table shows data from a mobility test that counts the number of times a person can stand from a seated position in 30 seconds.

Person's age (years)	50	55	60	65	70	75	80	85	90
Number of stands	20	18	16	14	13	12	10	9	8

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) State the form of the relationship between the variables. *[1 mark]*

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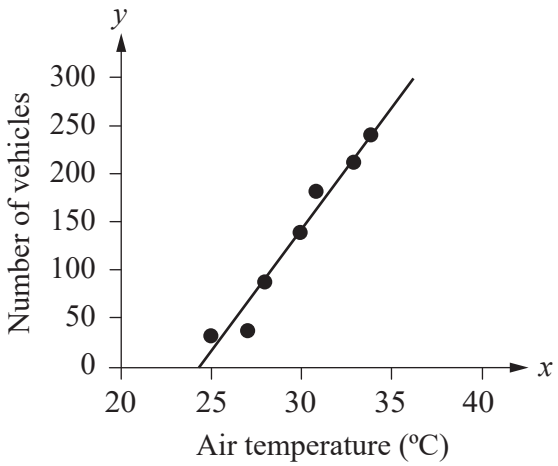
QUESTION 20 (4 marks)

The graph shows the association between the air temperature, x, and the number of vehicles parked at a train station, y.



Least-squares fit
$y = 25x - 610$
$r = 0.986$
$R^2 = 0.972$

a) Identify Pearson's correlation coefficient and use it to describe the strength of the association between x and y. *[2 marks]*

It is suggested that the time of day, t, could be a confounding variable in this situation.

b) Define *confounding variable*. *[1 mark]*

c) Explain why t could be a confounding variable in this situation. *[1 mark]*

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QUESTION 21 (3 marks)

A perpetuity earns interest quarterly at 5.2% p.a. and pays $975 each quarter.

a) Determine the quarterly interest rate. *[1 mark]*

b) Calculate the value of the perpetuity. *[2 marks]*

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QUESTION 22 (6 marks)

A reducing balance loan for $15 000 has an interest rate of 8.4% p.a. calculated monthly with a $250 repayment at the end of every month.

a) Use the monthly interest rate to write a recurrence relation for the loan balance after n months. *[2 marks]*

b) Calculate the loan balance after two months. *[1 mark]*

c) Use the reduction in the loan balance and the total repayments to determine the amount of interest paid in the first two months. *[3 marks]*

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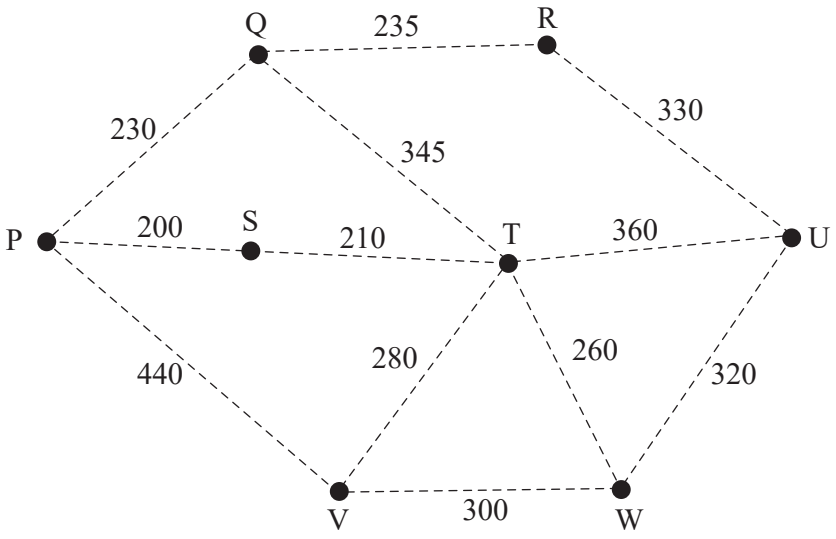
QUESTION 23 (4 marks)

A pipeline network transports natural gas between eight towns (P–W). The length (km) of each pipeline is shown.



a) On the diagram, draw the minimum spanning tree for the pipeline network. *[2 marks]*

Note: If you make a mistake in the diagram, 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 response to Question 23a) to evaluate the reasonableness of 2000 km of pipeline being sufficient to transport natural gas to the eight towns. *[2 marks]*

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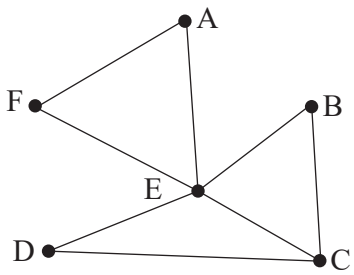
QUESTION 24 (5 marks)

The graph represents six students (A–F). Each edge connects two students who study an identical subject.



a) Construct an adjacency matrix from the graph with the vertices in alphabetical order. *[2 marks]*

b) From the terms shown, identify all that describe the graph. *[1 mark]*

bipartite	connected	directed	simple	weighted

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c) Identify all students who study an identical subject to student C. *[1 mark]*

d) Draw and label a connected subgraph that contains student E and has three edges and no cycles. *[1 mark]*

Note: If you make a mistake in the diagram, 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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QUESTION 25 (5 marks)

The table shows Darwin's actual rainfall (mm) each season for two years.

	2022	2023
Autumn	410	390
Winter	30	20
Spring	205	150
Summer	1135	1100

a) Calculate the seasonal index for each season in Darwin. *[3 marks]*

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This table shows Hobart's actual rainfall (mm) each season for 2023 and the long-term seasonal indices.

	Autumn	Winter	Spring	Summer
2023 rainfall (mm)	130	145	155	132
Seasonal index	0.92	1.02	1.12	0.94

b) Deseasonalise the Hobart rainfall data to identify the 2023 season with the highest seasonally adjusted rainfall. *[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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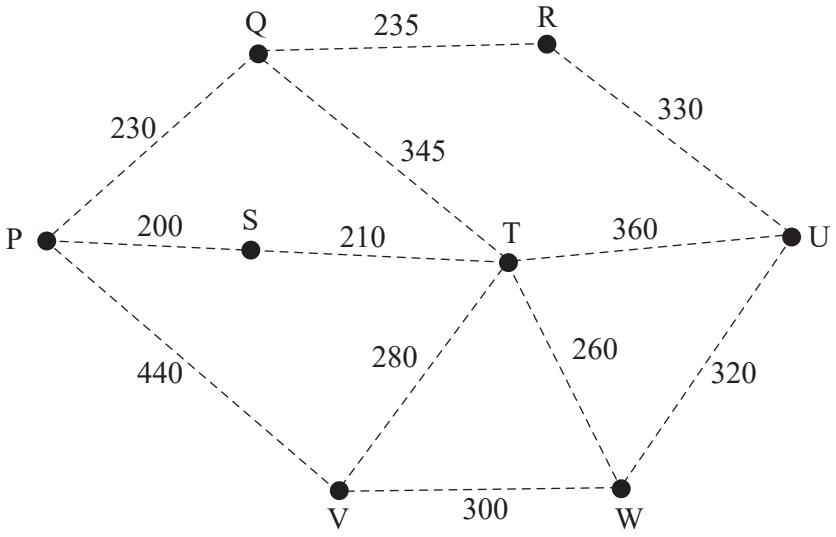
ADDITIONAL RESPONSE SPACE FOR QUESTION 23

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



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Clear zone — margin trimmed off after completion of assessment