EXAM PAPER

General Mathematics Unit 3 & 4 — Examination 2 (Practice 4)

PREVIEW
This file has the first 7 of the 13 questions in this paper. The rest is locked: it comes with a PrepNest plan, or with the paper itself for VCE.

Reading time: 15 minutes (no writing)
Writing time: 90 minutes
Total time: 105 minutes

SECTIONS IN THIS PAPER

- Data analysis — 36 min (calculator allowed)
- Recursion and financial modelling — 18 min (calculator allowed)
- Matrices — 18 min (calculator allowed)
- Networks and decision mathematics — 18 min (calculator allowed)

INSTRUCTIONS

You are not permitted to write during reading time — you may only read the paper and plan your approach. Answer every question you can. Write your working in the space provided for long-answer questions. Marking guidance and full explanations are provided in the separate answer key.

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Data analysis

36 minutes • Calculator allowed

Question 1

(6 marks)

The stem plot below shows the daily maximum temperature, in degrees Celsius, in a country town over 15 days in March.

Daily maximum temperature (°C)

Stem	Leaf
1	8 9
2	0 1 2 2 4 5 6 7 8
3	0 1 3
4	1

Key: 1 | 8 means 18 °C

a. Find the median temperature. 1 mark

b. Find the interquartile range. 1 mark

c. Show that the temperature of 41 °C is not an outlier. 2 marks

d. Find the mean and standard deviation of the temperatures, correct to one decimal place. 1 mark

e. Find the percentage of these days on which the maximum temperature was higher than 30 °C. 1 mark

Question 2

(6 marks)

The table below shows the hours of sunshine and the energy, in kilowatt-hours (kWh), generated by a household’s solar panels on eight days. Energy generated is to be predicted from hours of sunshine.

Sunshine and solar energy

Sunshine (hours)	2	3.5	5	6	7.5	8	9.5	11
Energy (kWh)	4.1	6.8	9.6	11.2	14.5	14.9	18.3	20.6

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a. Name the explanatory variable. 1 mark

b. Find the equation of the least squares line. Write the coefficients correct to two decimal places. 2 marks

c. Interpret the slope of the least squares line. 1 mark

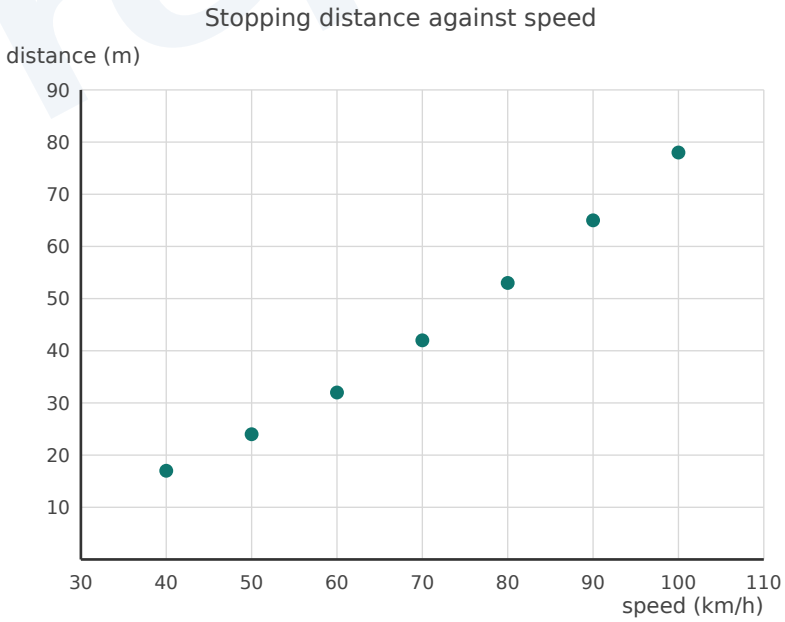
d. Find the coefficient of determination, correct to three decimal places, and interpret it. 1 mark

e. Find the residual for the day with 7.5 hours of sunshine, correct to two decimal places. 1 mark

Question 3

(6 marks)

The scatterplot below shows the stopping distance, in metres, of a car at different speeds, in km/h. The speeds 40, 50, 60, 70, 80, 90 and 100 km/h gave stopping distances of 17, 24, 32, 42, 53, 65 and 78 m.



a. A least squares line is fitted to the data, and its residual plot shows a clear U-shaped pattern. What does this indicate? 1 mark

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b. A squared transformation is applied to speed. Find the equation of the least squares line for stopping distance against speed^2. Write the coefficients correct to four significant figures. 2 marks

c. Find the coefficient of determination for the transformed data, correct to four decimal places. 1 mark

d. Use the transformed model to predict the stopping distance at 110 km/h, correct to one decimal place. 1 mark

e. Explain why this prediction may be unreliable. 1 mark

Question 4

(6 marks)

The time series plot below shows the number of visitors to a swimming pool on ten consecutive days. The numbers were 142, 156, 149, 171, 165, 188, 176, 195, 190 and 212.



a. Describe the features of the time series. 1 mark

b. Find the three-point moving average for day 5, correct to one decimal place. 1 mark

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c. Find the four-point moving average with centring for day 5, correct to one decimal place. 2 marks

d. A least squares line fitted to the data is visitors = 136.5 + 6.88 × day. Use it to predict the number of visitors on day 14, to the nearest whole number. 1 mark

e. Interpret the slope of this least squares line. 1 mark

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Recursion and financial modelling

18 minutes • Calculator allowed

Question 5

(4 marks)

A farm buys a crop-spraying drone for $9600. It can be depreciated by the unit cost method at $0.80 per kilometre flown, and it is expected to fly 1500 km each year. Alternatively, it can be depreciated by the reducing balance method at 18% per year.

a. Write down a recurrence relation for the value V_n, in dollars, of the drone after n years using unit cost depreciation. 1 mark

b. Using unit cost depreciation, after how many years is the value of the drone first less than $3000? 1 mark

c. Find the value of the drone after four years using reducing balance depreciation, correct to the nearest cent. 1 mark

d. Which method gives the higher value after five years, and by how much? 1 mark

Question 6

(4 marks)

Ari borrows $520 000 to buy a house. Interest is charged at 5.88% per annum, compounding monthly, and the loan is to be repaid with equal monthly repayments over 25 years.

a. Find the monthly repayment, correct to the nearest cent. 1 mark

b. Find the balance of the loan after five years, correct to the nearest dollar. 1 mark

c. Assuming all 300 repayments are $3312.33, find the total interest paid over the life of the loan. 1 mark

d. After five years the interest rate rises to 6.6% per annum, compounding monthly. Find the new monthly repayment, correct to the nearest cent, that would still repay the loan in 25 years in total. 1 mark

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Question 7

(4 marks)

Noah opens a savings account with $2000. The account pays interest at 4.2% per annum, compounding monthly, and Noah deposits $400 at the end of every month.

a. Write down a recurrence relation for the balance V_n, in dollars, after n months. 1 mark

b. Find the balance after three years, correct to the nearest cent. 1 mark

c. Find the total interest earned over the three years. 1 mark

d. Find the monthly deposit, correct to the nearest cent, that would give a balance of $30 000 after four years. 1 mark

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12.

13.

6 questions locked, up to question 13.

PREVIEW

That’s the end of the preview

You’ve seen the first 7 of the 13 questions in General Mathematics Unit 3 & 4 — Examination 2 (Practice 4). The full paper is worth 60 marks.

STILL TO COME	QUESTIONS	MARKS
Matrices	3	12
Networks and decision mathematics	3	12

The full paper comes with

- Every question, printed exactly like the ones in this preview
- The complete answer key, with the working behind every mark
- A topic report after marking, showing what to practice next

Get the full paper at

prepnest.com.au/practice/exams/general_maths-year_12-4-exam2

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