EXAM PAPER

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

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 number of minutes late for 12 trains arriving at a city station on one morning is shown in the table below.

Minutes late

Train	1	2	3	4	5	6	7	8	9	10	11	12
Minutes late	8	2	13	5	29	7	10	4	12	6	9	5

a. Find the median number of minutes late. 1 mark

b. Find the first quartile, the third quartile and the interquartile range. 2 marks

c. Show that the value 29 is an outlier. 2 marks

d. Describe the shape of the distribution. 1 mark

Question 2

(6 marks)

The hours of practice and the score out of 25 on a skills test for six students are shown in the table below. Score is to be predicted from hours of practice.

Practice and score

Hours of practice	2	4	5	7	9	11
Score (out of 25)	5	9	10	15	18	22

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

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c. Interpret the slope of the least squares line in the context of this data. 1 mark

d. Find the correlation coefficient r, correct to three decimal places. 1 mark

e. Use the least squares line to predict the score of a student who practises for 6 hours, correct to one decimal place, and state whether this prediction is an interpolation or an extrapolation. 1 mark

Question 3

(6 marks)

The masses of apples from an orchard are approximately normally distributed with a mean of 150 g and a standard deviation of 12 g.

a. Using the 68–95–99.7% rule, find the percentage of apples with a mass between 126 g and 174 g. 1 mark

b. Using the 68–95–99.7% rule, find the percentage of apples with a mass greater than 162 g. 1 mark

c. Find the standardised score of an apple with a mass of 141 g. 1 mark

d. A crate holds 2000 apples from this orchard. Using the 68–95–99.7% rule, find the number of apples expected to have a mass less than 126 g. 1 mark

e. An apple has a standardised score of 1.5. Find its mass. 1 mark

f. An apple with a mass of 200 g is found. Explain, with a calculation, whether this apple is unusual. 1 mark

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Question 4

(6 marks)

The table below shows the quarterly sales, in thousands of dollars, of a garden supply business over two years. The seasonal indices, correct to two decimal places, are 0.95 for Quarter 1, 1.10 for Quarter 3 and 0.70 for Quarter 4.

Quarterly sales ($ thousands)

	Quarter 1	Quarter 2	Quarter 3	Quarter 4
Year 1	48	62	55	35
Year 2	52	70	60	38

a. Find the mean quarterly sales, in thousands of dollars, for Year 1. 1 mark

b. Show that the seasonal index for Quarter 2 is 1.26, correct to two decimal places. 1 mark

c. Deseasonalise the Quarter 4 sales for Year 2. Give your answer in thousands of dollars, correct to two decimal places. 1 mark

d. Interpret the seasonal index for Quarter 4. 1 mark

e. A least squares line fitted to the deseasonalised data is deseasonalised sales = 45 + 1.5t, where t = 1 is Quarter 1 of Year 1. Use this line and the seasonal index for Quarter 2 to forecast the actual sales for Quarter 2 of Year 3, in thousands of dollars. 2 marks

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Recursion and financial modelling

18 minutes • Calculator allowed

Question 5

(4 marks)

Jo buys a food truck for $68 000 and is comparing two depreciation methods: flat rate depreciation of $6120 per year, or reducing balance depreciation at 12% per year.

a. Write down a recurrence relation that models the value V_n, in dollars, of the food truck after n years using flat rate depreciation. 1 mark

b. Find the value of the food truck after five years using flat rate depreciation. 1 mark

c. Find the value of the food truck after five years using reducing balance depreciation, correct to the nearest cent. 1 mark

d. After how many years is the value under flat rate depreciation first lower than the value under reducing balance depreciation? 1 mark

Question 6

(4 marks)

Kai borrows $36 000 to buy a car. Interest is charged at 8.4% per annum, compounding monthly, and Kai repays $900 at the end of each month.

a. Find the monthly interest rate. 1 mark

b. Write down a recurrence relation that models the balance B_n, in dollars, of the loan after n months. 1 mark

c. Find the balance of the loan after two years, correct to the nearest dollar. 1 mark

d. Find the number of monthly repayments needed to repay the loan in full. (The final repayment may be less than $900.) 1 mark

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Question 7

(4 marks)

Mei’s retirement fund has a balance of $480 000 and earns interest at 5.1% per annum, compounding monthly. She withdraws $4000 at the end of each month.

a. Find the interest earned in the first month. 1 mark

b. Find the balance of the fund after the first withdrawal. 1 mark

c. Find the monthly withdrawal that Mei could make if she wanted the fund to act as a perpetuity. 1 mark

d. Find the number of full $4000 withdrawals that Mei can make before the fund runs out. 1 mark

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8.

9.

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10.

11.

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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 3). 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_12-3-exam2

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