EXAM PAPER

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

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

(8 marks)

The stem plot below shows the time, in minutes, that 11 students take to travel to school.

Travel time to school (minutes)

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

Key: 1 | 2 means 12

a. Write down the median travel time. 1 mark

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

c. Show that the travel time of 41 minutes is an outlier. 1 mark

d. Find the mean and the standard deviation of the travel times, correct to two decimal places. 2 marks

e. Describe the shape of the distribution. 1 mark

f. The student who takes 41 minutes moves closer to school and is removed from the data. Explain which of the mean and the median changes more. 1 mark

Question 2

(6 marks)

The commute times of workers in a large city are approximately normally distributed with a mean of 34 minutes and a standard deviation of 6 minutes.

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a. Using the 68–95–99.7% rule, find the percentage of workers whose commute is between 22 and 46 minutes. 1 mark

b. Find the percentage of workers whose commute is longer than 40 minutes. 1 mark

c. Out of 2000 workers, find the number expected to have a commute shorter than 28 minutes. 1 mark

d. Find the standardised score of a worker whose commute is 43 minutes. 1 mark

e. In a second city, commute times have a mean of 40 minutes and a standard deviation of 8 minutes. Ravi, who works in the second city, has a standardised commute time of -0.5. Find Ravi's commute time. 1 mark

f. Lena works in the first city and commutes for 30 minutes. Relative to the workers in their own city, who has the shorter commute, Lena or Ravi? Justify your answer. 1 mark

Question 3

(6 marks)

The table below shows the arm span and height, both in centimetres, of eight students. Height is to be predicted from arm span.

Arm span and height of eight students

Student	Arm span (cm)	Height (cm)
1	150	152
2	156	155
3	160	162
4	163	161
5	168	170
6	172	171
7	175	178
8	181	180

a. Name the explanatory variable. 1 mark

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b. Find the equation of the least squares line for predicting height from arm span. Give the coefficients correct to three significant figures. 2 marks

c. Interpret the slope of the least squares line in terms of the variables. 1 mark

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

e. Using the equation from part b, find the residual for student 4. Give your answer correct to one decimal place. 1 mark

Question 4

(4 marks)

The table below shows the number of visitors, in hundreds, to a museum over seven consecutive quarters.

Visitors to a museum (hundreds)

Quarter number, t	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Visitors	42	36	51	47	40	55	50

a. Find the three-point moving average for t = 3, correct to two decimal places. 1 mark

b. Find the four-point moving average with centring for t = 4, correct to three decimal places. 1 mark

c. The seasonal index for the quarter at t = 6 is 1.1. Find the deseasonalised number of visitors, in hundreds, for t = 6. 1 mark

d. A least squares line fitted to the deseasonalised data is deseasonalised visitors = 38.4 + 1.6t. The seasonal index for the quarter at t = 12 is 0.9. Forecast the actual number of visitors in quarter 12. 1 mark

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Recursion and financial modelling

18 minutes • Calculator allowed

Question 5

(4 marks)

A café buys a coffee machine for $12 000. It is depreciated using the reducing balance method at a rate of 15% per annum.

a. Write down a recurrence relation that models the value V_n, in dollars, of the machine after n years. 1 mark

b. Find the value of the machine after four years, correct to the nearest cent. 1 mark

c. Find the annual amount of flat rate depreciation that would give the same value after four years, correct to the nearest cent. 1 mark

d. Using reducing balance depreciation, after how many years will the value of the machine first fall below $3000? 1 mark

Question 6

(4 marks)

Priya borrows $450 000 to buy a unit. Interest is charged at 6.0% per annum, compounding monthly. 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 cent. 1 mark

c. Find the total interest Priya pays in the first five years, correct to the nearest cent. 1 mark

d. After five years the interest rate falls to 5.4% per annum, compounding monthly. Priya keeps making repayments of $2899.36. Find the number of further monthly repayments needed to repay the loan, where the last repayment may be smaller than the others. 1 mark

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Question 7

(4 marks)

Ming invests $600 000 in an account paying interest at 4.5% per annum, compounding monthly, to fund their retirement.

a. Find the monthly payment Ming could withdraw indefinitely, so that the investment acts as a perpetuity. 1 mark

b. Ming instead withdraws $4000 at the end of each month. Find the balance after one year, correct to the nearest cent. 1 mark

c. With withdrawals of $4000 per month, find the number of withdrawals that can be made, where the last withdrawal may be smaller than the others. 1 mark

d. Find the effective annual interest rate for this account, correct to two decimal places. 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 2). 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_12-2-exam2

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