EXAM PAPER

General Mathematics Unit 3 & 4 — Examination 2 (Practice 5)

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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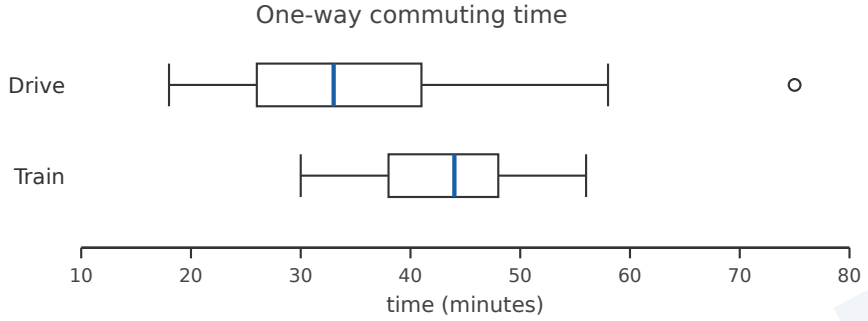
Data analysis

36 minutes • Calculator allowed

Question 1

(6 marks)

The parallel box plots below show the one-way commuting times, in minutes, of a sample of workers who drive to work and a sample who catch the train.



a. Find the difference between the median commuting times of the two groups. 1 mark

b. Find the interquartile range for each group. 1 mark

c. Show that the commuting time of 75 minutes for the drive group is an outlier. 2 marks

d. Compare the two distributions in terms of their centre and spread, quoting values. 2 marks

Question 2

(6 marks)

The table below shows the hours of training per week and the time, in minutes, to run 5 km for seven runners. Run time is to be predicted from hours of training.

Training and 5 km run time

Training (hours per week)	2	3	4	5	6	7	8
Run time (minutes)	31.5	30.2	29.4	27.9	27.1	26	25.2

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

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

c. Find the residual for the runner who trains for 5 hours per week, correct to two decimal places. 1 mark

d. Interpret the coefficient of determination in the context of this data. 1 mark

e. Use the line to predict the run time of a runner who trains for 12 hours per week, and comment on the reliability of this prediction. 1 mark

Question 3

(6 marks)

The lengths of snapper caught in a bay are approximately normally distributed with a mean of 36 cm and a standard deviation of 5 cm.

a. Using the 68–95–99.7% rule, find the percentage of snapper with a length between 26 cm and 46 cm. 1 mark

b. Of 600 snapper caught, how many would be expected to be shorter than 31 cm? 1 mark

c. The legal minimum length is 31 cm. Find the standardised score of a snapper of this length. 1 mark

d. A snapper has a standardised score of 2.4. Find its length. 1 mark

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e. Flathead in the same bay have lengths that are approximately normally distributed with a mean of 45 cm and a standard deviation of 4 cm. A snapper of 44 cm and a flathead of 52 cm are caught. Which fish is longer relative to its own species? Justify your answer. 2 marks

Question 4

(6 marks)

The table below shows a household's quarterly electricity bills, in dollars, over two years.

Quarterly electricity bills ($)

	Quarter 1	Quarter 2	Quarter 3	Quarter 4
Year 1	420	310	520	350
Year 2	440	330	560	370

a. Describe the main feature of this time series. 1 mark

b. Show that the seasonal index for Quarter 3, correct to two decimal places, is 1.31. 2 marks

c. The seasonal index for Quarter 2 is 0.78. Deseasonalise the Year 2, Quarter 2 bill, correct to the nearest dollar. 1 mark

d. A least squares line fitted to the deseasonalised bills is deseasonalised bill = 395 + 4.2t, where t = 1 is Quarter 1 of Year 1. Forecast the actual bill for Quarter 3 of Year 3, correct to the nearest dollar. 2 marks

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Recursion and financial modelling

18 minutes • Calculator allowed

Question 5

(4 marks)

A boat bought for $45 000 is depreciated by the reducing balance method. After one year its value is $38 250.

a. Find the annual rate of depreciation. 1 mark

b. Write down a recurrence relation for the value V_n, in dollars, of the boat after n years. 1 mark

c. Find the value of the boat after five years, correct to the nearest dollar. 1 mark

d. After how many years will the value of the boat first be less than $15 000? 1 mark

Question 6

(4 marks)

Tom borrows $32 000 to buy a car. Interest is charged at 7.2% per annum, compounding monthly, and Tom repays $750 at the end of each month.

a. Find the balance of the loan after one year, correct to the nearest cent. 1 mark

b. Find the number of monthly repayments needed to repay the loan. 1 mark

c. Find the amount of the final repayment, correct to the nearest cent. 1 mark

d. Find the total interest paid over the life of the loan, correct to the nearest cent. 1 mark

Question 7

(4 marks)

A school invests $150 000 in an account paying 4.5% per annum, compounding monthly, to fund a monthly scholarship payment.

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a. Find the monthly payment if the investment is to act as a perpetuity. 1 mark

b. Instead, the school pays $1000 at the end of each month. Find the number of full payments that can be made before the fund runs out. 1 mark

c. With payments of $1000 per month, find the balance of the fund after ten years, correct to the nearest cent. 1 mark

d. Find the amount that would need to be invested at the same rate for the fund to pay $1000 per month as a perpetuity, correct to the nearest cent. 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 5). 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_12-5-exam2

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