

External assessment 2022

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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School code

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School name

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Given name/s

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Family name

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Book

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of

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books used

Attach your
barcode ID
label here

Section 1

Instructions

- Choose the best answer for Questions 1–15.
- 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.
- 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:	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

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	A	B	C	D
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2.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
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15.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

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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 ...

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- If you do not do this, your original response will be marked.
 - This section has 10 questions and is worth 42 marks.
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Question 16 (3 marks)

The table shows the number of sales for a small business in their first six months of trading.

Time in months, t	Number of sales, n
1	86
2	180
3	160
4	226
5	240
6	335

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a) Use your calculator to determine the equation of the least-squares line.
[1 mark]

b) Use the equation from Question 16a) to predict the number of sales in the 21st month. [2 marks]

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Question 17 (4 marks)

An investment of \$50 000 that compounds interest monthly is modelled by the recurrence relation

$$A_{n+1} = 1.00375A_n \text{ where } A_0 = 50\,000.$$

- a) What would be the advertised interest rate per annum, compounding monthly?
[2 marks]

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b) How many months would it take for the value of the investment to exceed \$51 000? [2 marks]

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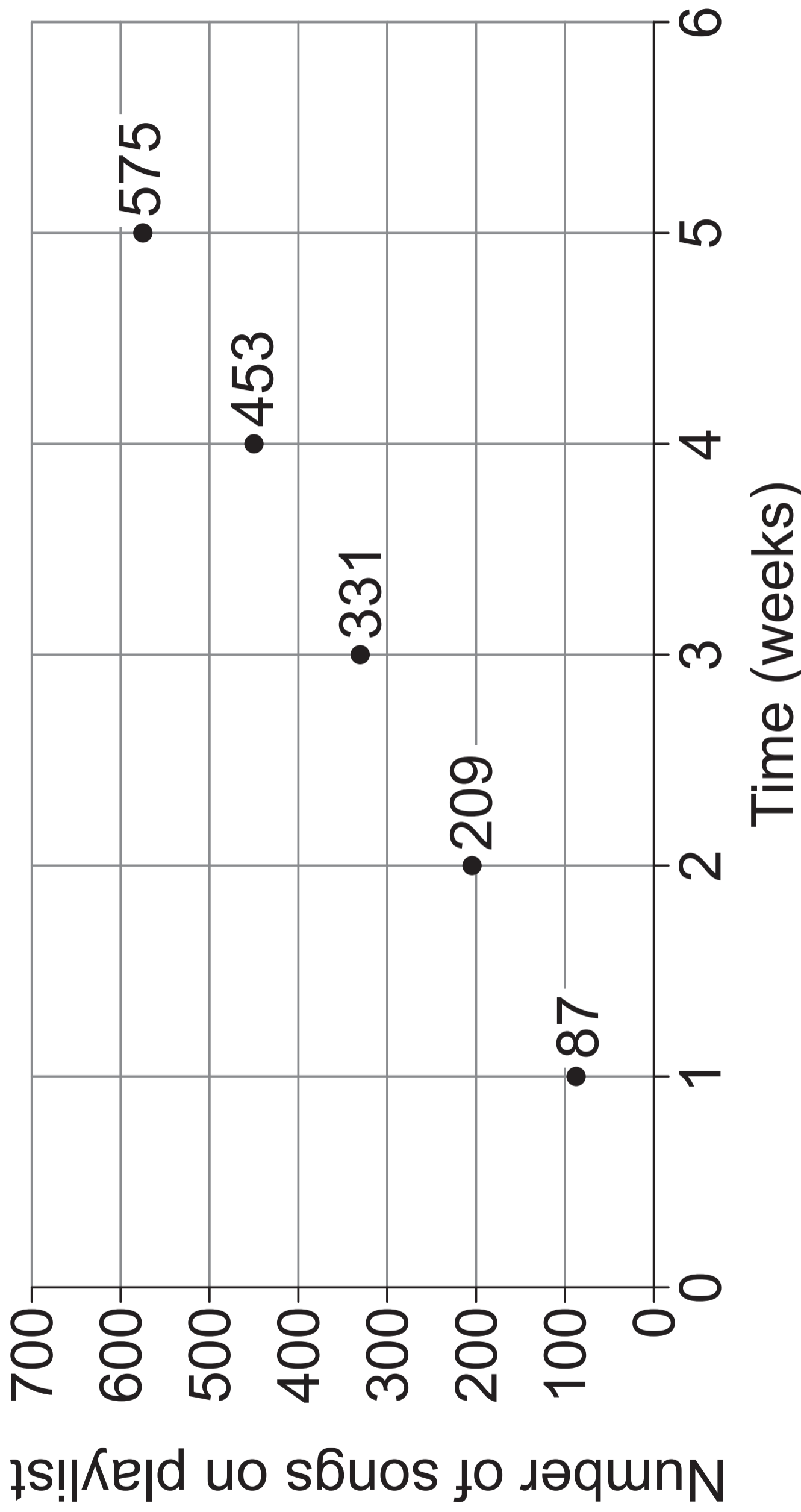


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Question 18 (4 marks)

The number of songs on a person's playlist, n , in each week since joining a music streaming service, t , forms an arithmetic sequence, as shown by the graph.



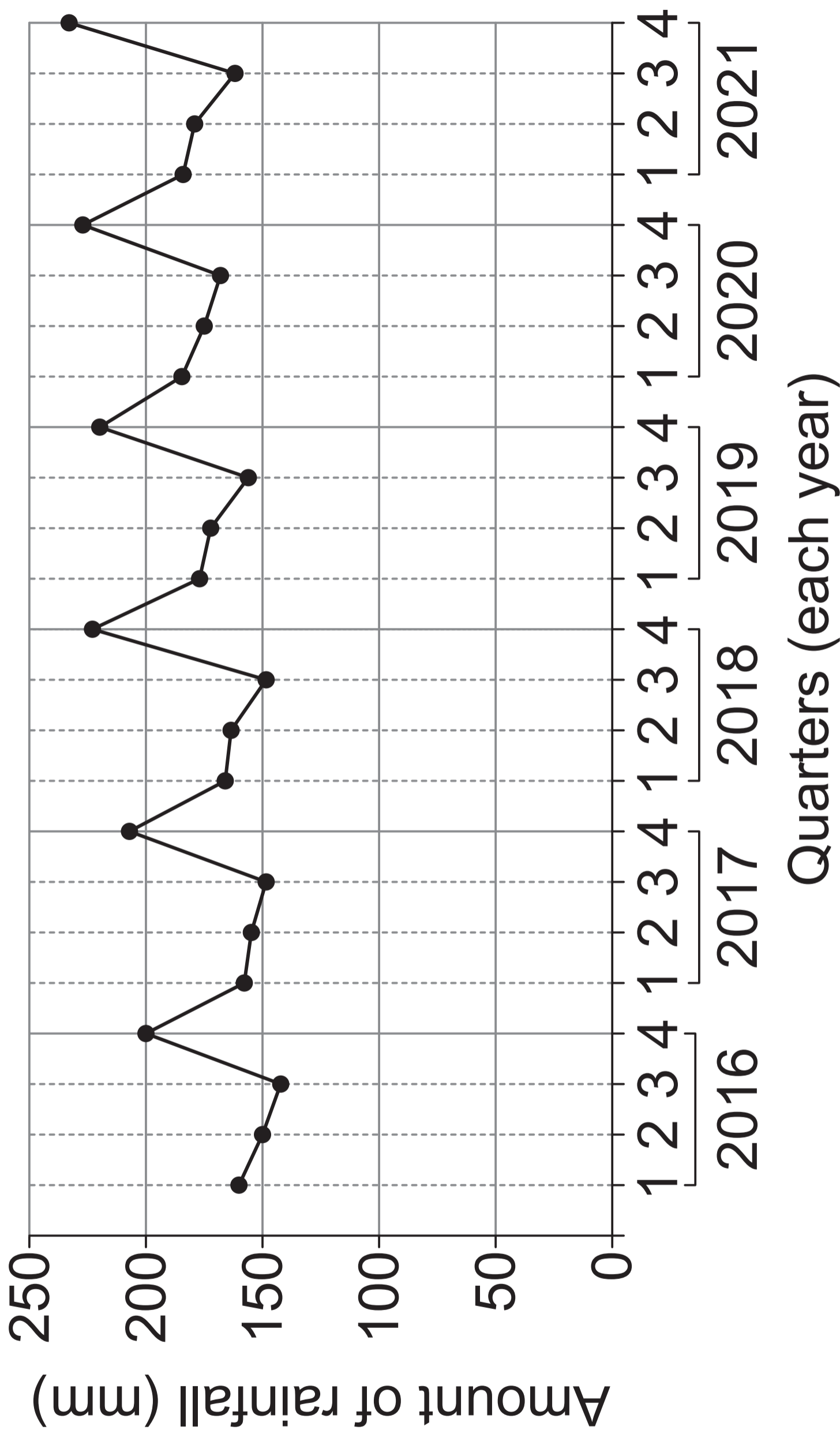
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Use the arithmetic sequence to predict the number of songs on this person's playlist 25 weeks after joining the streaming service.

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Question 19 (4 marks)

The graph shows the amount of rainfall (in mm) for each quarter from 2016 to 2021.



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a) Describe the long-term trend and seasonality of the time series data. [2 marks]

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b) A least-squares line was fitted to the data, with y representing the amount of rainfall and x representing the number of quarters since the beginning of 2016 (e.g. $x = 5$ for the first quarter of 2017).

$$y = 1.763x + 156.5$$

Interpret the y -intercept and slope of the fitted line.
[2 marks]

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Question 20 (4 marks)

The table summarises the distances in kilometres (km) between three flower stores and three delivery locations: A, B and C.

Use the Hungarian algorithm to determine the minimum total distance needed to deliver flowers to all locations if each store delivers flowers to only one location.

	A	B	C
Store 1	19	17	24
Store 2	15	14	22
Store 3	23	16	40

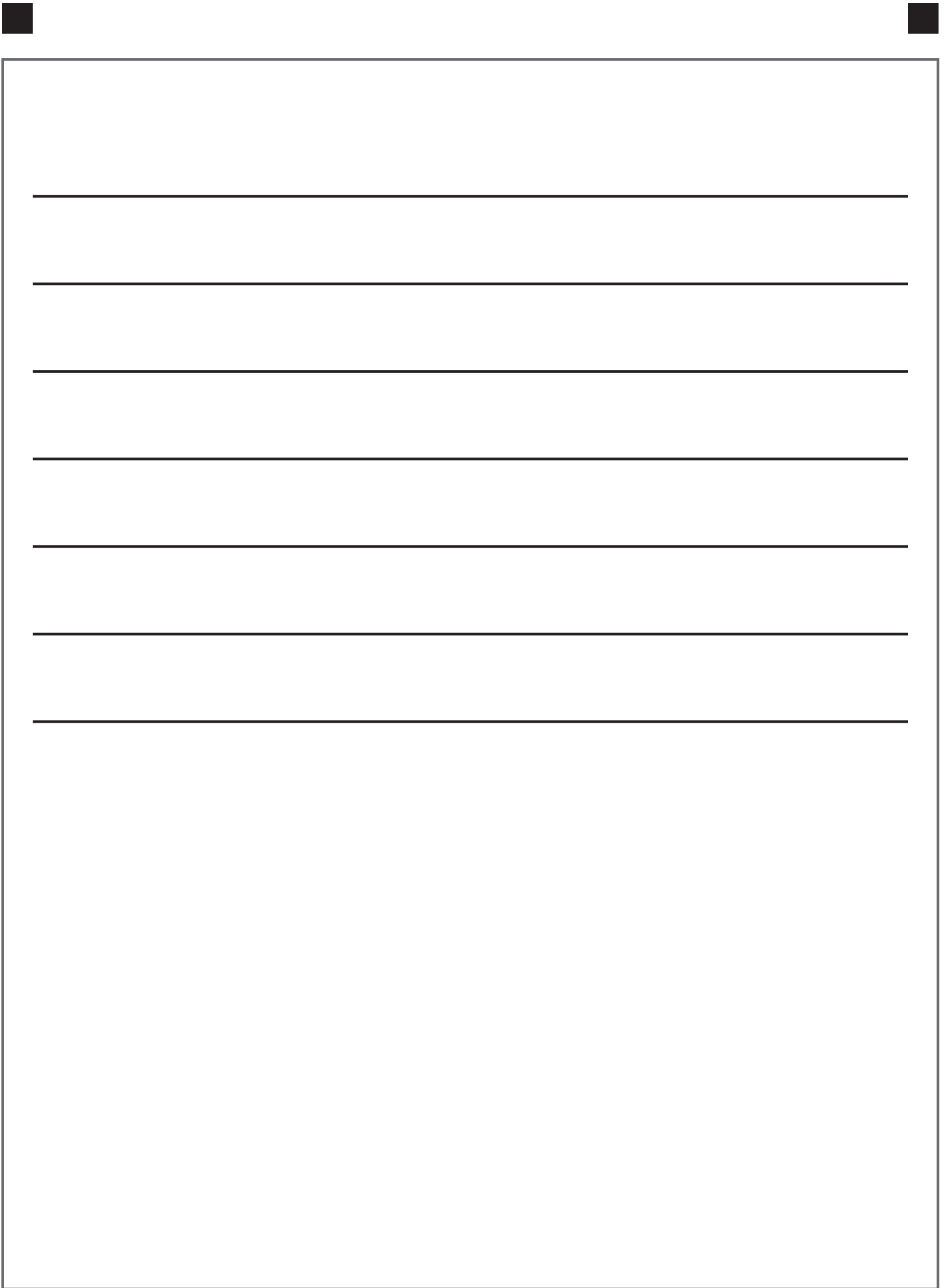
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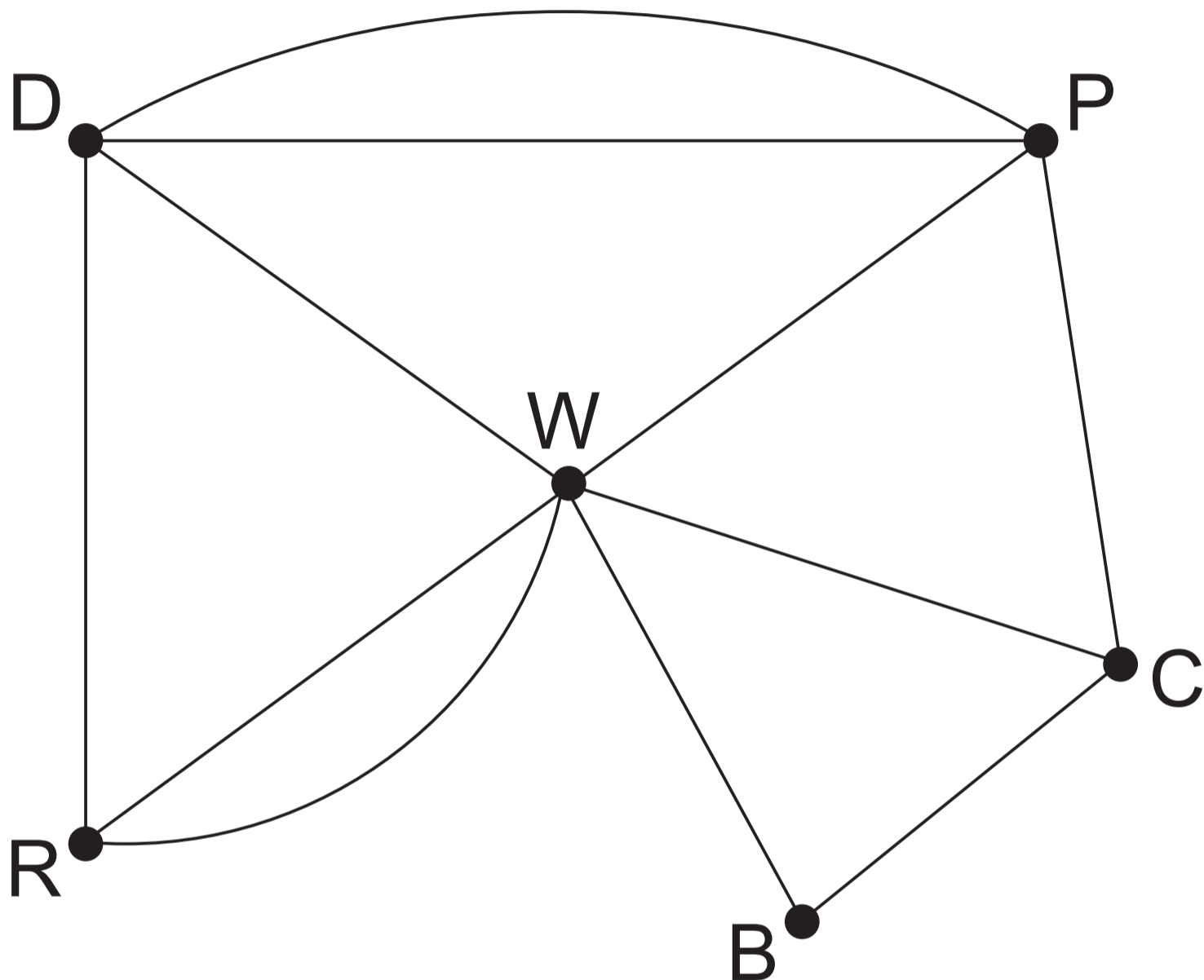


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Question 21 (5 marks)

The paths connecting various landmarks in a park are shown.



Key

B Bus stop

P Playground

C Coffee shop

R Rose garden

D Duck pond

W Water feature

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a) Identify one cycle that passes through the rose garden and the playground. [1 mark]

b) Identify whether the graph is Eulerian or semi-Eulerian. Justify your response. [2 marks]

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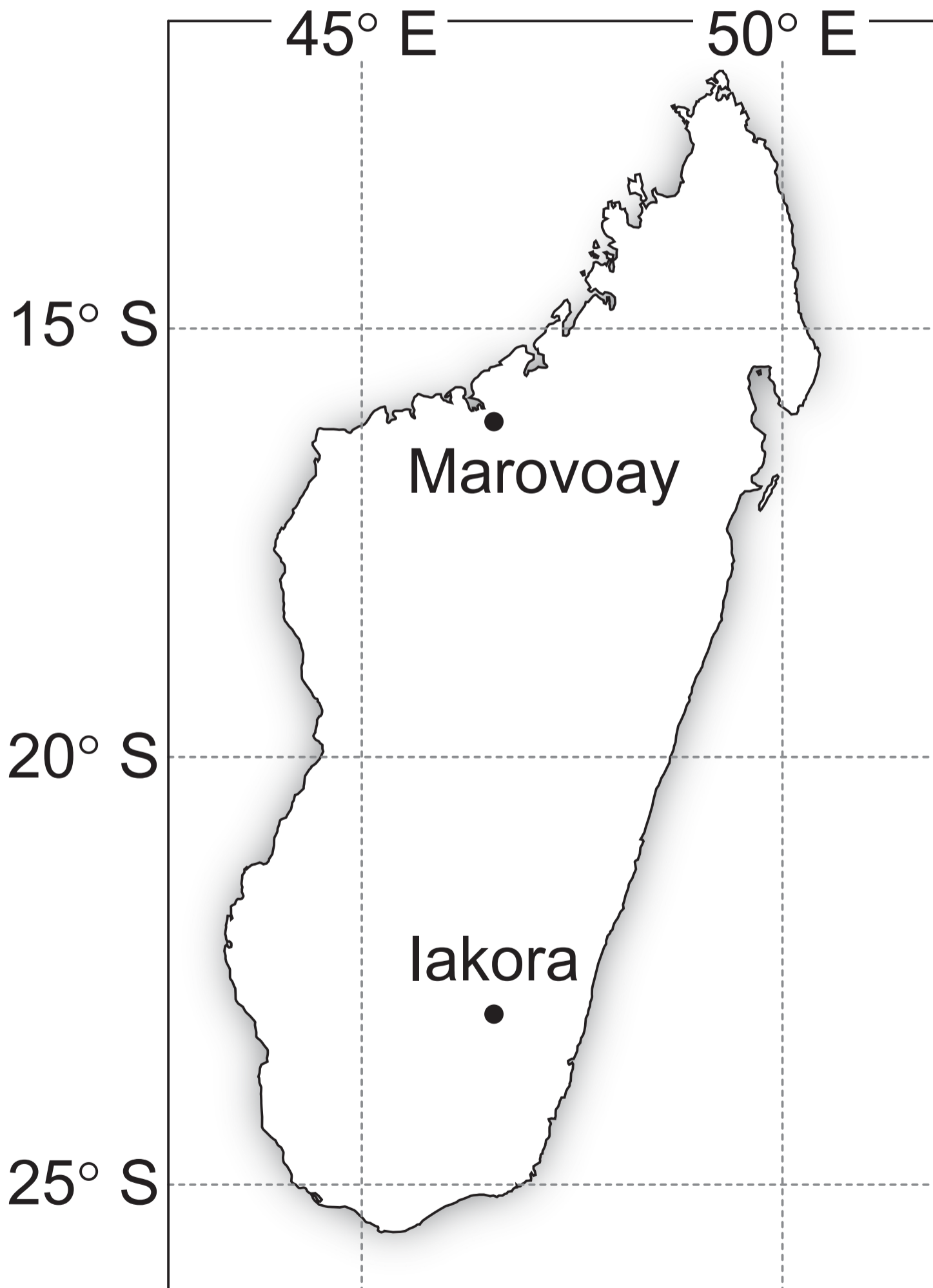
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Question 22 (4 marks)

Marovoay and Iakora are located on the same meridian at 46.6° E, as shown on the map of Madagascar.



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a) Determine the latitudes of Marovoay and lakora. [1 mark]

b) Use the result from Question 22a) to determine the shortest distance between Marovoay and lakora. [3 marks]

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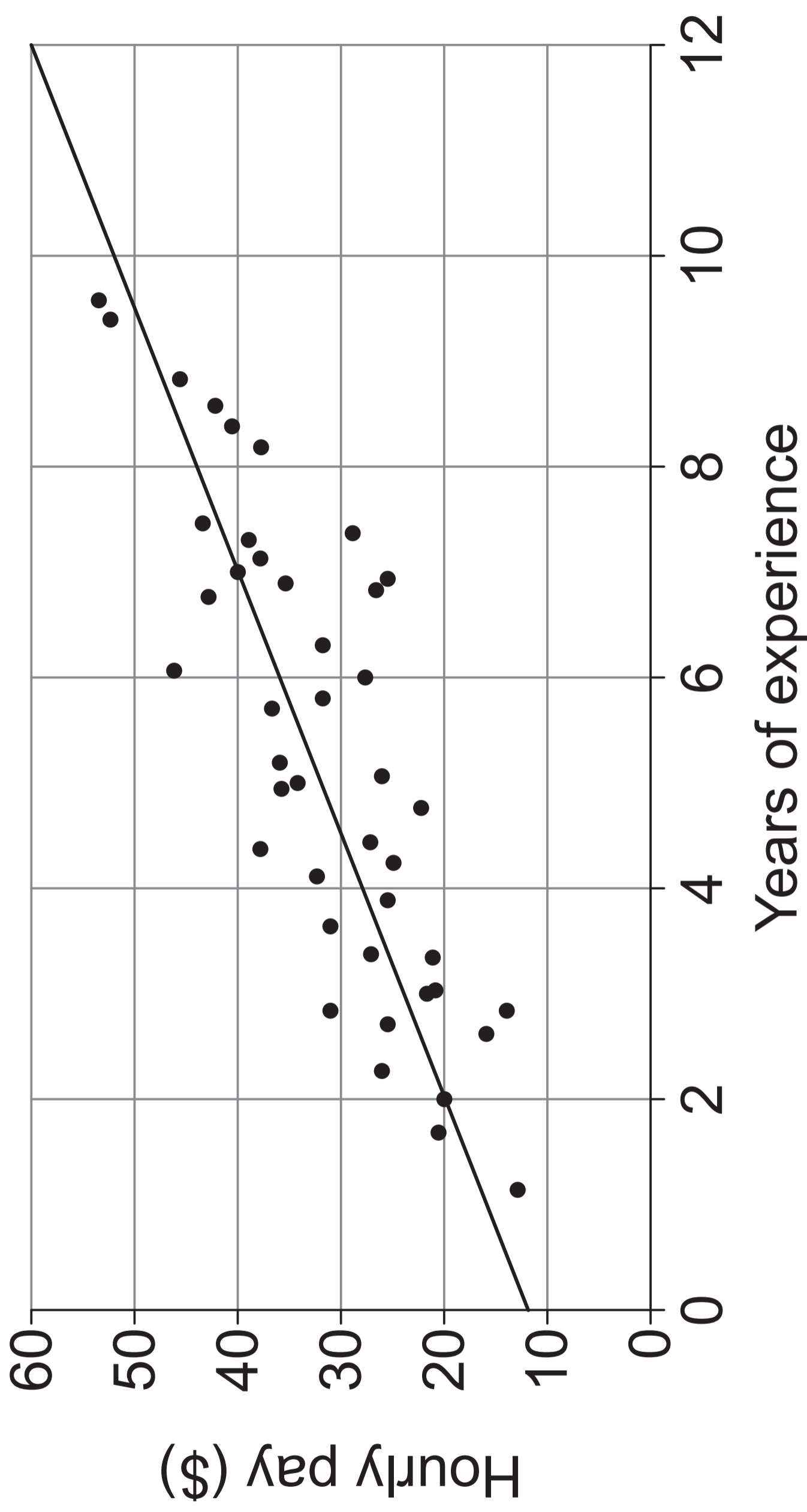


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Question 23 (4 marks)

The least-squares line has been provided for a scatterplot that shows the association between an employee's years of experience, n , and their hourly pay, p .



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a) Given that the least-squares line passes directly through the points $(2, 20)$ and $(7, 40)$, determine its equation. [2 marks]

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b) Use the equation from Question 23a) to predict the hourly pay of an employee with 15 years experience.
[2 marks]

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Question 24 (5 marks)

The maximum temperature and the number of pies sold each day at a bakery are provided in the table.

Maximum temperature (°C)	29	20	31	27	23	25	22	33
Number of pies sold	32	39	25	33	37	35	37	30

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.

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b) Describe the association between the maximum temperature and the number of pies sold in terms of direction and strength. [2 marks]

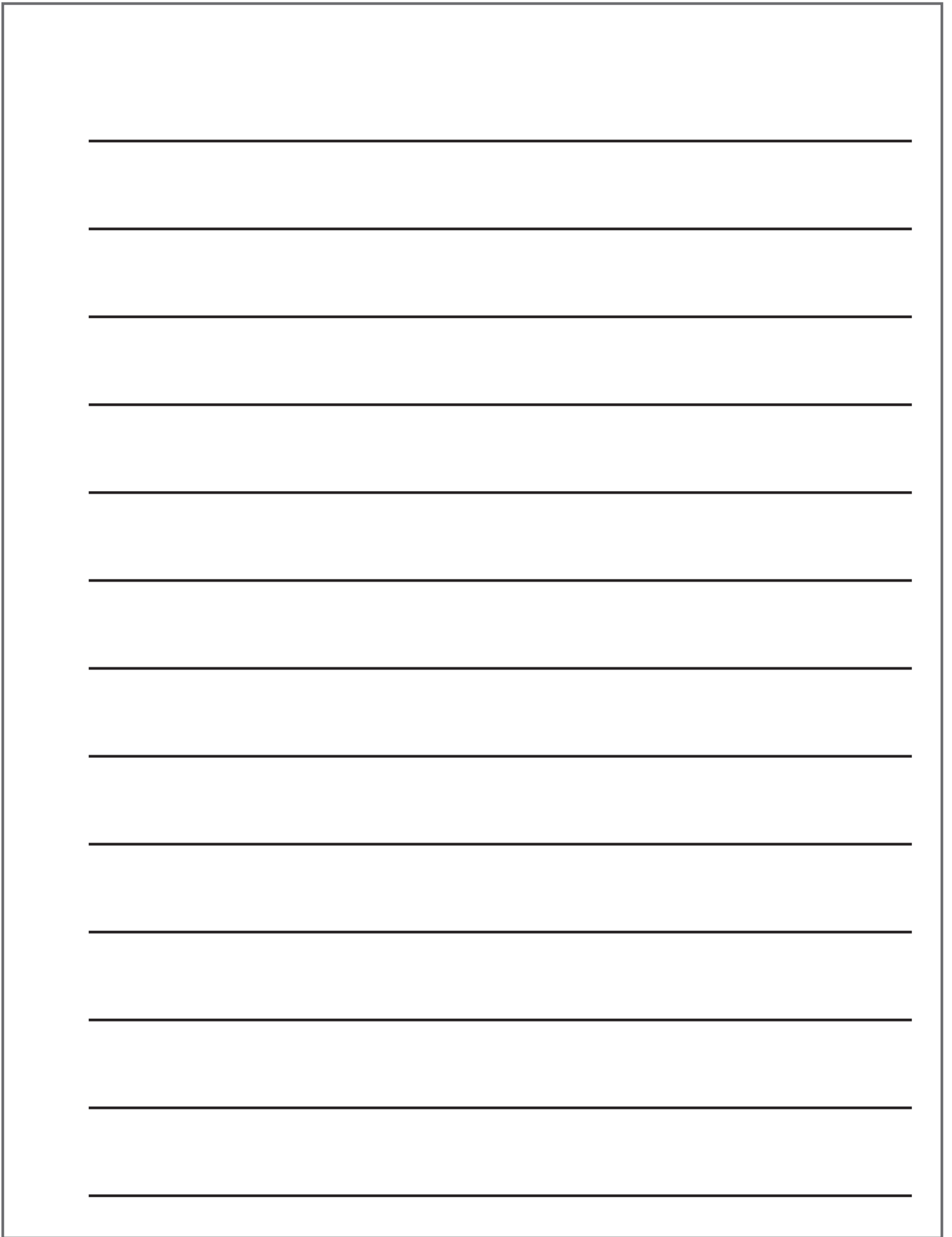
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Question 25 (5 marks)

A couple borrow money to complete home renovations. Their bank has loaned the amount at 2.4% p.a. compounding monthly with repayments of \$993.14 each month for 15 years.

- a) Determine the amount of money borrowed. [3 marks]

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b) Write a recurrence relation for the amount owing after n months. [2 marks]

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