

# External assessment 2023

## Question and response book

# Biology

## Paper 1

### Time allowed

- Perusal time — 10 minutes
- Working time — 90 minutes

### General instructions

- Answer all questions in this question and response book.
- QCAA-approved calculator permitted.
- Planning paper will not be marked.





## **Section 1 (20 marks)**

- 20 multiple choice questions

## **Section 2 (26 marks)**

- 7 short response questions
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# Section 1

## Instructions

- This section has 20 questions and is worth 20 marks.
- Use a 2B pencil to fill in the A, B, C or D answer bubble completely.
- Choose the best answer for Questions 1–20.
- 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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<b>2.</b>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>3.</b>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>4.</b>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
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<b>19.</b>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>20.</b>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Ensure you have filled an answer bubble for each question.

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## Section 2

### Instructions

- Write using black or blue pen.
  - 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 ...
    - If you do not do this, your original response will be marked.
  - This section has seven questions and is worth 26 marks.
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## Question 21 (4 marks)

The diagram represents a section of DNA.

This content has been redacted until copyright has been assessed and cleared.

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Identify the DNA components indicated by labels 1–4.

1. \_\_\_\_\_

2. \_\_\_\_\_

3. \_\_\_\_\_

4. \_\_\_\_\_

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## Question 22 (2 marks)

Describe two ways bacteria assist matter to cycle through ecosystems.

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### **Question 23 (3 marks)**

Mistletoe is the common name for plants that have a close and long-term interaction with a host tree. In Australia, mistletoe frequently live on eucalyptus trees, penetrating the bark with their modified root systems to access water and nutrients from the xylem. This can restrict nutrient flow in the host tree and may cause parts of its branches to die.

- a) Identify the species interaction demonstrated in this scenario. [1 mark]

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b) Explain how this relationship differs from predation. [2 marks]

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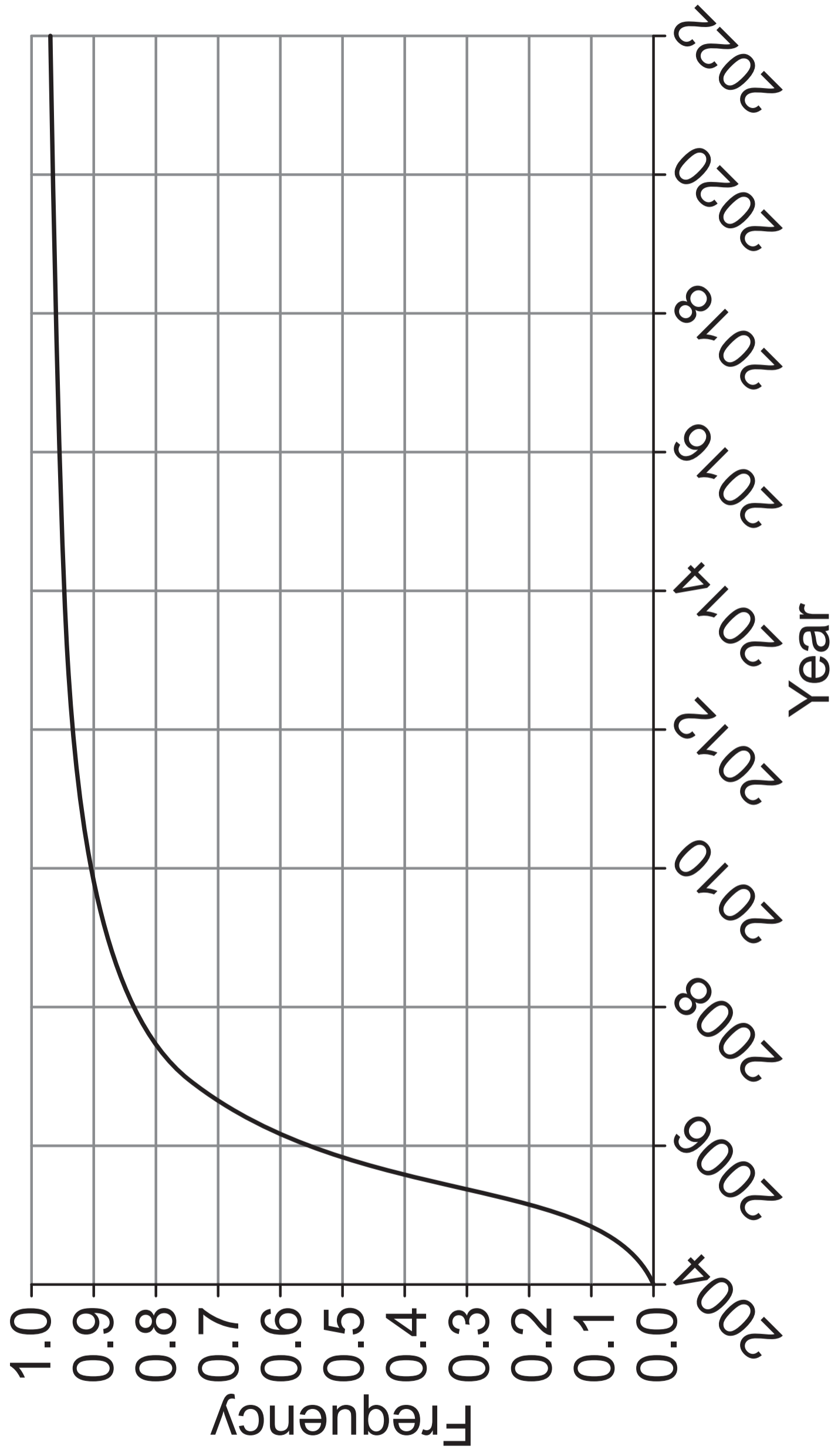
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### Question 24 (5 marks)

The frequency of a new allele was monitored in a population of insects over an 18-year period.



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**a) Infer if the new allele is advantageous or detrimental in this environment. Justify your response using evidence from the graph. [2 marks]**

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b) Explain how mutations can contribute to microevolutionary change in populations that reproduce sexually. [3 marks]

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### Question 25 (6 marks)

The effect of an invasive species on plant biodiversity was investigated by collecting this data from an ecosystem.

		Percentage cover (invasive species)			
		0–20%	>20–40%	>40–60%	>60–80–100%
Plant biodiversity	Species richness	7	7	4	2
	Simpson's diversity index	0.83	0.77	0.55	0.30

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a) Contrast species richness in areas of low invasive species cover (0–20%) with areas of high invasive species cover (>80–100%). [1 mark]

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**b) Draw a conclusion about the effect of the invasive species on plant biodiversity in this ecosystem. Justify your response. [2 marks]**

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c) Explain why having data on species richness and Simpson's diversity index is more informative than a single measure for the purpose of this investigation. [3 marks]  
Refer to the table to support your response.

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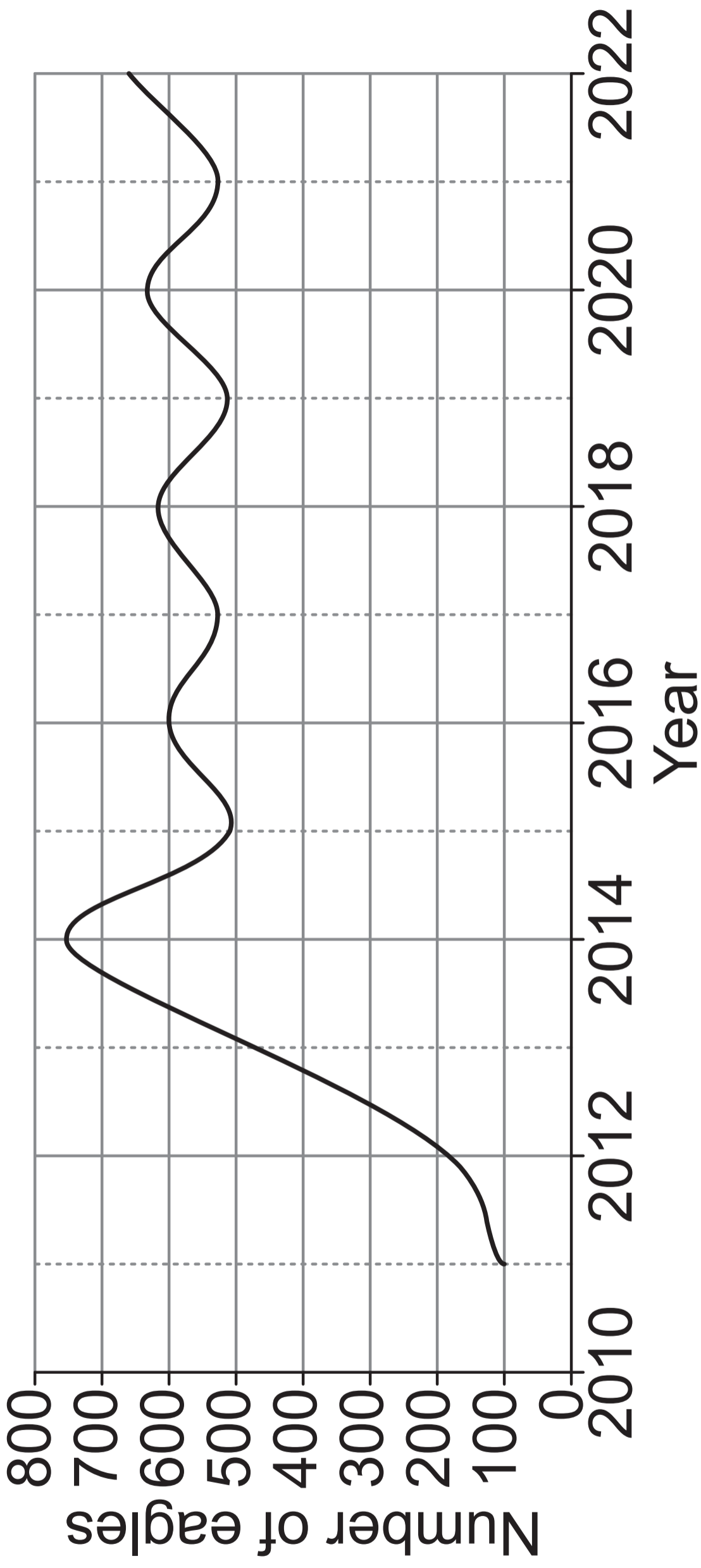
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**Question 26 (3 marks)**

Wedge-tailed eagles are large birds that reside in tall trees, where they build nests for their young. They often feed on ground-dwelling herbivores such as kangaroos and rabbits.

The graph on the next page shows the number of wedge-tailed eagles observed in an ecosystem over time.

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a) Determine the carrying capacity of wedge-tailed eagles in this ecosystem. [1 mark]

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b) Explain how a change to one abiotic factor could reduce the carrying capacity. [2 marks]

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### **Question 27 (3 marks)**

Clownfish have 24 pairs of chromosomes and reproduce via external fertilisation, with gametes initially created through meiosis. Females lay up to 1500 eggs and then males swim over the eggs and fertilise them.

Explain how the processes of independent assortment and random fertilisation create variation in the genotypes of clownfish offspring.

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# References

## Question 21

Derived from Clark, MA, Cho, J & Douglas, M 2018, *Biology 2e* (iBooks), OpenStax, Rice University, Houston, <https://openstax.org/details/books/biology-2e?Book%20details>.

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