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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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Attach your  
barcode ID label here

Book

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of

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books used

External assessment 2025

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 (29 marks)

- 6 short response questions



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**THIS PAGE WILL NOT BE MARKED**

# 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"/>

	A	B	C	D
1.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3.	<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"/>
16.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
17.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
18.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
19.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
20.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Ensure you have filled an answer bubble for each question.

Do not write outside this box.

## 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 six questions and is worth 29 marks.
- 

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**QUESTION 21 (4 marks)**

a) Describe two key features of the Linnaean system of biological classification. *[2 marks]*

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b) Explain, using an example, how the Linnaean system allows researchers to infer similarities between species. *[2 marks]*

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**QUESTION 22 (5 marks)**

a) Compare the role of pioneer species in primary and secondary succession.

*[3 marks]*

Similarity: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Difference: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Significance: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

b) Describe two ways climax communities differ from pioneer communities.

*[2 marks]*

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Do not write outside this box.

**QUESTION 23 (6 marks)**

a) Identify two enzymes involved in DNA replication and describe their functions. *[4 marks]*

Enzyme 1: \_\_\_\_\_

Function: \_\_\_\_\_

\_\_\_\_\_

Enzyme 2: \_\_\_\_\_

Function: \_\_\_\_\_

\_\_\_\_\_

b) Explain how synthesis of the leading strand is different from the lagging strand. *[2 marks]*

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

**QUESTION 24 (2 marks)**

Describe the structure of plasmids and their role in making recombinant DNA.

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

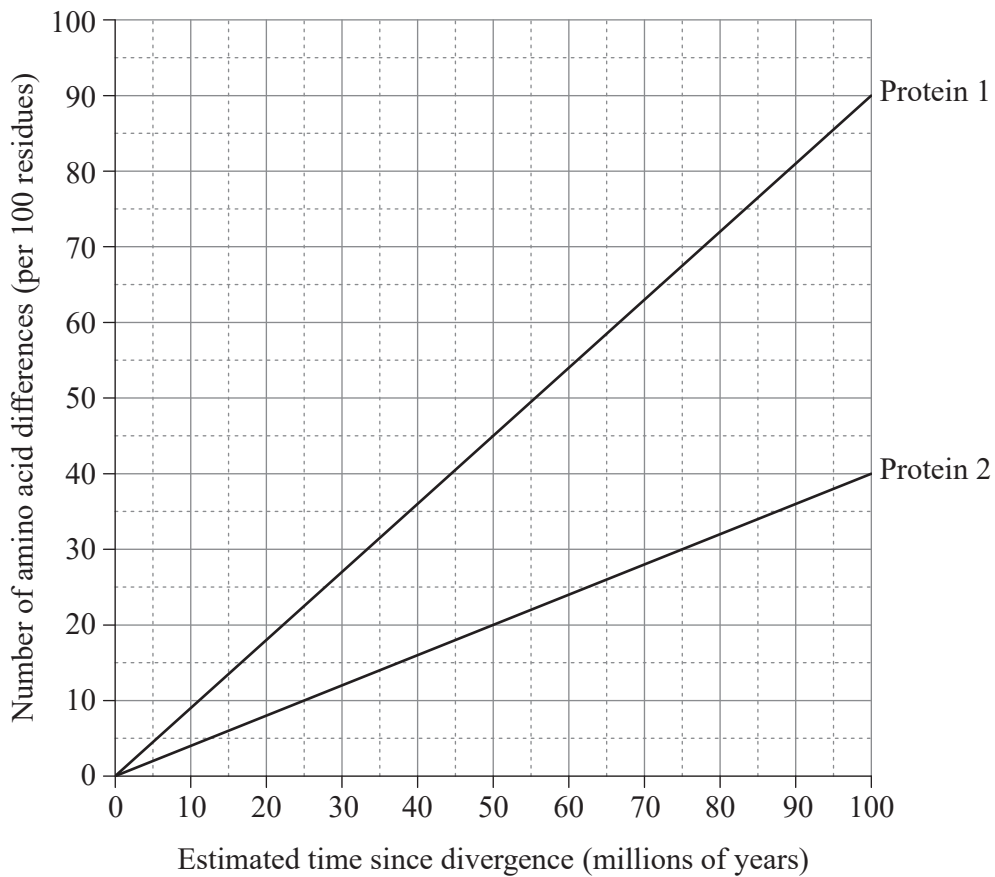
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**QUESTION 25 (5 marks)**

Molecular sequence data from two proteins was used to determine the relatedness of giant pandas, red pandas, polar bears and ferrets.

The graph shows the mutation rate of the two proteins used in the investigation.



The table shows the average number of amino acid differences observed (per 100 residues) in protein 1.

	Giant panda	Red panda	Polar bear	Ferret
Giant panda		44	18	43
Red panda			45	36
Polar bear				44
Ferret				

a) Infer which species is most closely related to the ferret.

[1 mark]

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b) Predict the number of amino acid differences (per 100 residues) between polar bears and red pandas for protein 2. Justify your response.

[2 marks]

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c) Use your knowledge of convergent and divergent evolution to explain why molecular sequence data is often more accurate than anatomical data for determining the relatedness of different species.

[2 marks]

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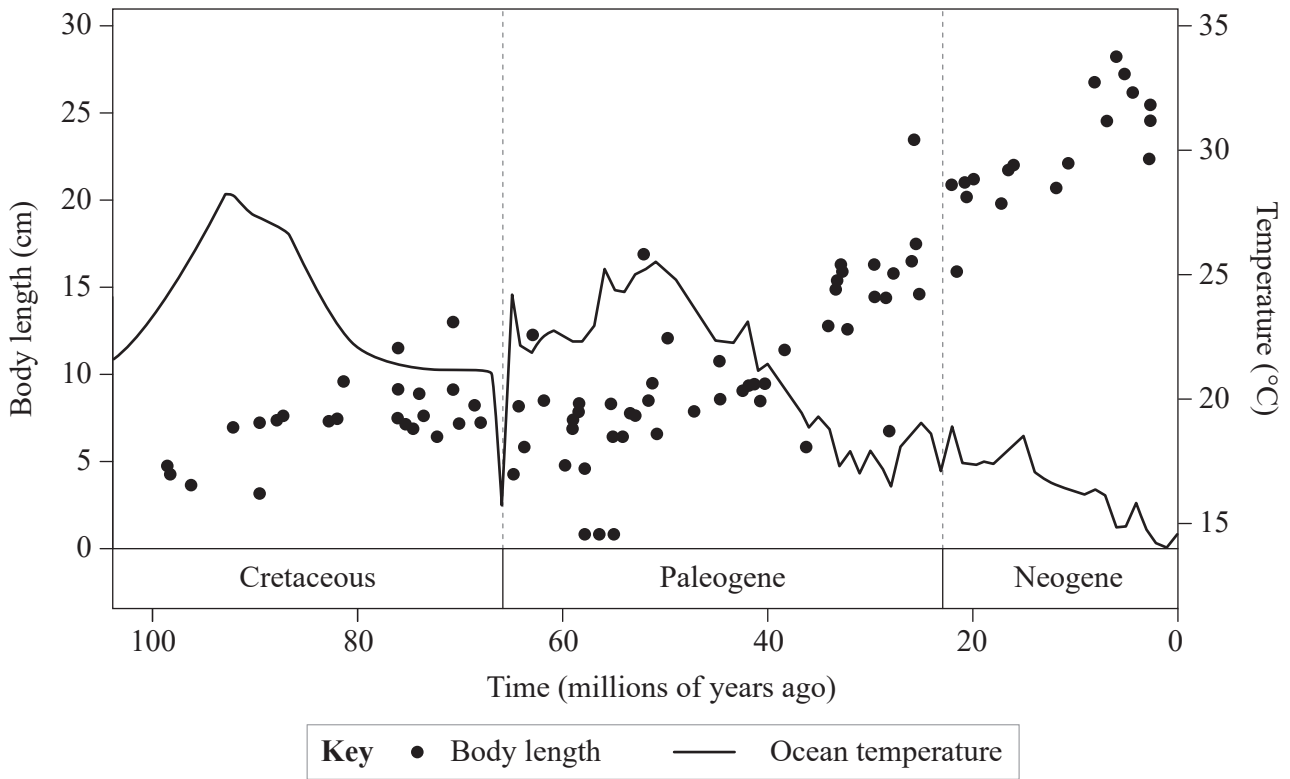
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### QUESTION 26 (7 marks)

Scientists investigating the impact of ocean temperature on the evolution of marine organisms compiled the data shown.



- a) Identify the abiotic changes that occurred at the boundary of the Cretaceous and Paleogene periods. Refer to the data in your response.

[2 marks]

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b) Identify a relationship between ocean temperature and body length.

[1 mark]

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c) Use the principles of natural selection to provide a possible explanation for the trend in body length over geological time.

[3 marks]

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d) Identify the type of phenotypic selection that has occurred.

[1 mark]

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**END OF PAPER**

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## References

### Question 25

Data from Yi, SV 2021, 'Molecular Evolution: A Brief Introduction', in Ho, SYW (eds), The Molecular Evolutionary Clock, Springer, Cham, pp. 25–34, [https://doi.org/10.1007/978-3-030-60181-2\\_2](https://doi.org/10.1007/978-3-030-60181-2_2)

### Question 26

Troyer, EM et al. 2022, 'The Impact of Paleoclimatic Changes on Body Size Evolution in Marine Fishes', Proceedings of the National Academy of Sciences of the United States of America, vol. 119, no. 29, <https://doi.org/10.1073/pnas.2122486119>

Data and information provided in this paper may have been developed or adjusted for exam purposes and should not be taken as factual.



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