

QCE Biology Units 3&4

Paper 1

Student's Name: _____

Teacher's Name: _____

Time allowed

- Perusal time – 10 minutes
- Working time – 90 minutes

General instructions

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

Section 1 (25 marks)

- 25 multiple choice questions

Section 2 (25 marks)

- 5 short response questions

Students are advised that this is a trial examination only and cannot in any way guarantee the content or the format of the 2022 QCE Biology Units 3&4 Written Examination.

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SECTION 1

Instructions

- Choose the best answer for Questions 1–25.
- This section has 25 questions and is worth 25 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"/>

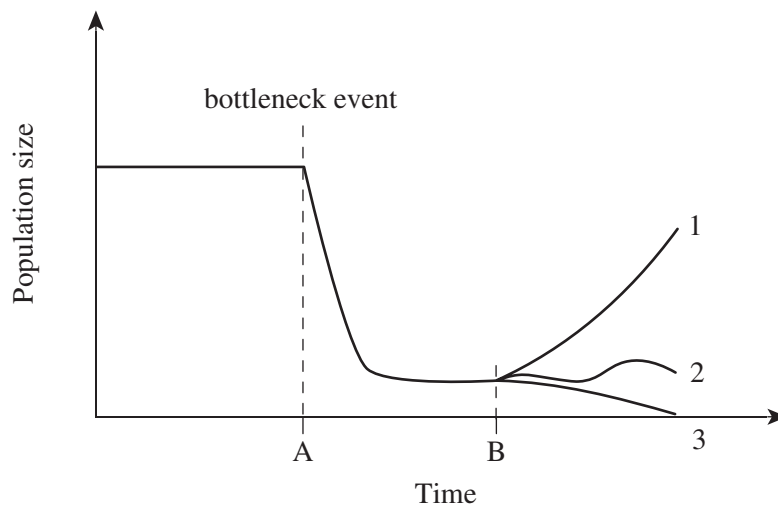
	A	B	C	D
1.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
5.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
6.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
7.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
8.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
9.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
10.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
11.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
12.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
13.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
14.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
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"/>
21.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
22.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
23.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
24.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
25.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

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 booklet.
 - 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 five questions and is worth 25 marks.

QUESTION 26 (3 marks)

The graph shows that a population has gone through a bottleneck event at point A. There are three possibilities (1, 2 and 3) for the future of the population after point B.

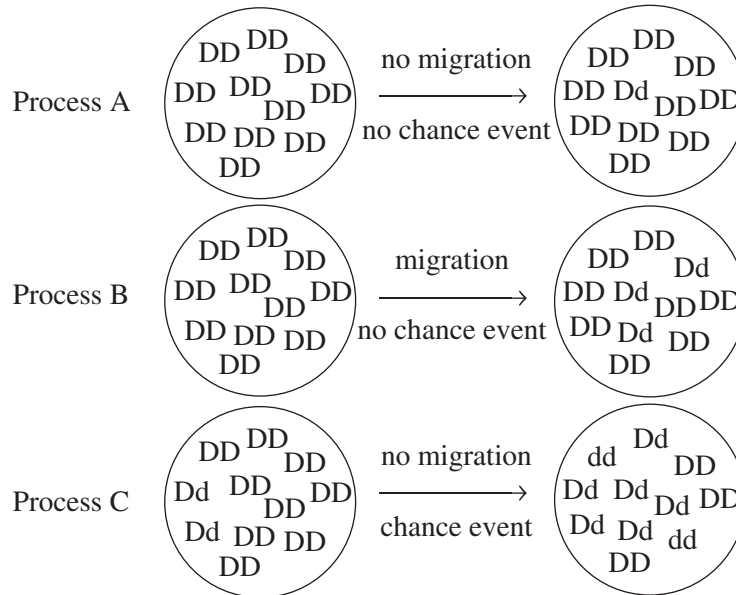


Explain how each of these three possibilities may arise.

QUESTION 27 (5 marks)

Biologists have long sought to understand the relationship between microevolution, which can be observed both in nature and in the laboratory, and macroevolution, which occurs over intervals of time that far exceed the human lifespan.

The diagram shows some of the processes involved in helping us understand these evolutionary activities.



- a) Define the terms microevolution and macroevolution. [2 marks]

Microevolution _____

Macroevolution _____

- b) Identify and explain each of the three evolutionary processes depicted in the diagram above. [3 marks]

Process A _____

Process B _____

Process C _____

QUESTION 28 (4 marks)

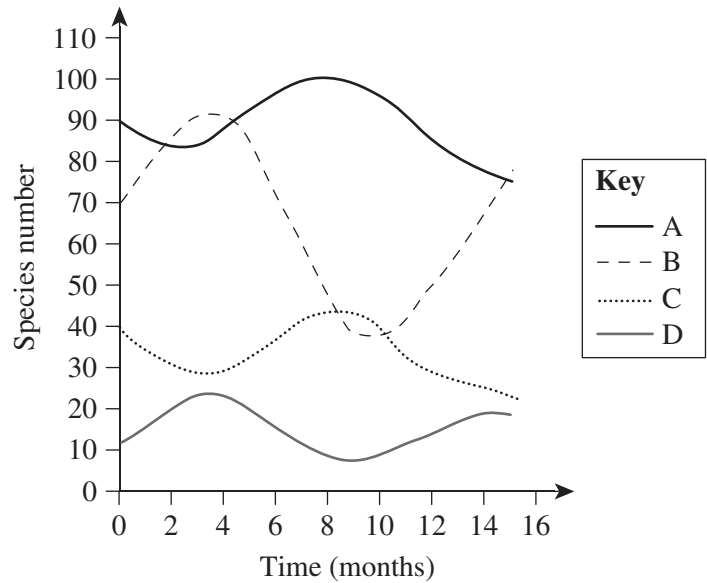
The table lists the steps in the process of making recombinant DNA.

Complete the table to describe what occurs at each step of the process.

Step	Description
isolation of DNA	
cutting of DNA	
insertion and joining of DNA fragment	
amplification of recombinant DNA	

QUESTION 29 (9 marks)

The graph shows the fluctuations in the number of species found in four populations (A–D) in a marine community. The populations include parasitic worms, the fish the parasitic worms live in, algae and sharks.



- a) Complete the table below by determining the richness, abundances, percentage frequencies and the Simpson’s Diversity Index (SDI) for the marine community at nine months. Calculate your answer using the SDI as shown in the equation

$$SDI = 1 - \left(\frac{\sum n(n-1)}{N(N-1)} \right),$$

where N is the total number of organisms of all species and n is the number of organisms of one species.

[5 marks]

Species indices	Month 3				Month 9			
Richness	4							
Abundance	A = 24	B = 38	C = 86	D = 92	A = 99	B =	C = 43	D =
Percentage frequency (%)	A = 10	B = 16	C = 36	D = 38	A =	B = 20	C =	D = 4
SDI	0.69							

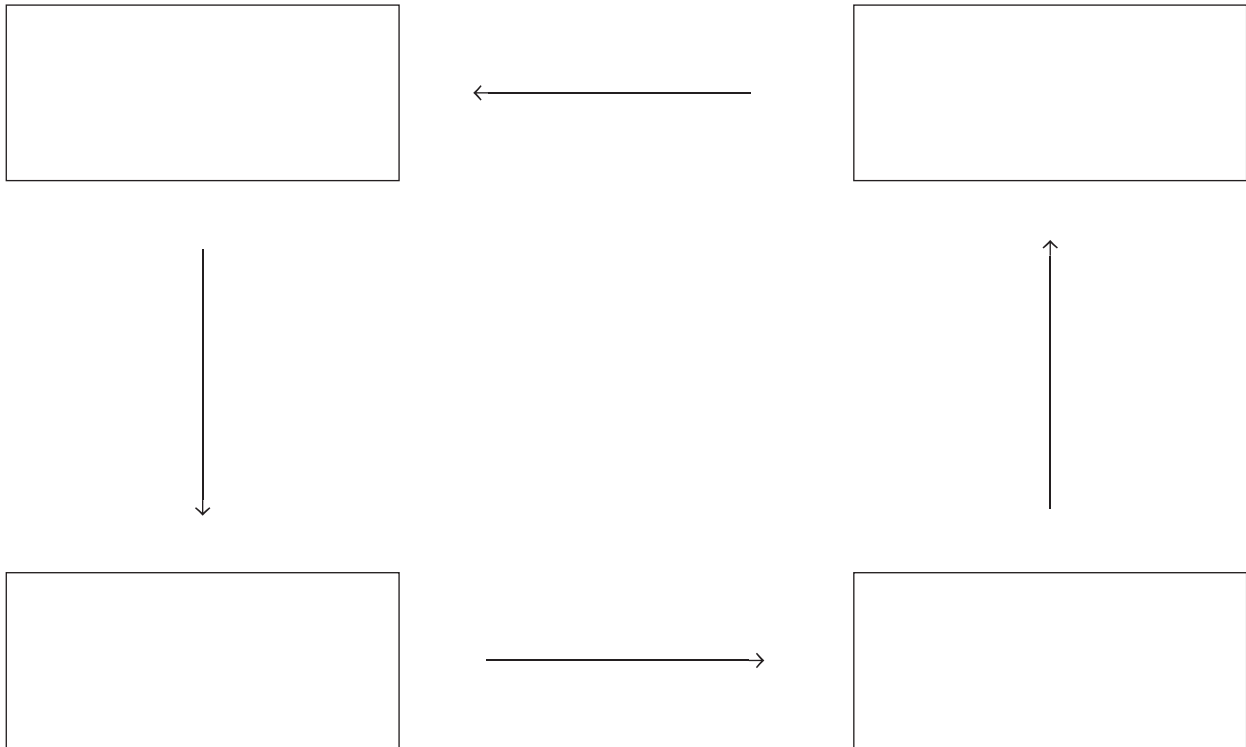
QUESTION 30 (4 marks)

A geochemical cycle is the pathway that chemical substances take in the atmosphere, surface and crust of the Earth.

Examples of geochemical cycles include:

- water
- carbon
- nitrogen.

Complete the flow chart by stating the matter transformation steps for one of the geochemical cycles listed above.



END OF PAPER

