LUI | | | | | | | | | | | School code | | | | |

School name

Given name/s

Family name

Attach your barcode ID label here

Book of books used

External assessment 2023

Question and response book

Marine Science

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

Clear zone — margin trimmed off after completion of assessment

Queensland Government | QCAA Queensland Curriculum & Assessment Authority

DO NOT WRITE ON THIS PAGE

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:	●	○	○	○

	A	B	C	D
1.	○	○	○	○
2.	○	○	○	○
3.	○	○	○	○
4.	○	○	○	○
5.	○	○	○	○
6.	○	○	○	○
7.	○	○	○	○
8.	○	○	○	○
9.	○	○	○	○
10.	○	○	○	○
11.	○	○	○	○
12.	○	○	○	○
13.	○	○	○	○
14.	○	○	○	○
15.	○	○	○	○
16.	○	○	○	○
17.	○	○	○	○
18.	○	○	○	○
19.	○	○	○	○
20.	○	○	○	○

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 seven questions and is worth 26 marks.

QUESTION 21 (3 marks)

Explain the need for agreements to manage migratory species in international waters.

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QUESTION 22 (5 marks)

a) Identify an argument for mangrove conservation. Give two reasons to support your argument. *[3 marks]*

b) Identify a management strategy that could support the health of mangrove habitats. Explain your reasoning. *[2 marks]*

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QUESTION 23 (5 marks)

The table shows the marine organisms sighted during a survey of three reefs in the Great Barrier Reef Marine Park.

Organism	Reef A	Reef B	Reef C
Sea cucumber	6	4	1
Giant clam	4	0	3
Anemonefish	0	0	0
Butterflyfish	1	1	3
Grazing herbivores	2	20	5
Grouper	1	0	0
Coral trout	2	0	2
Maori wrasse	0	0	1
Turtle	2	0	0
Shark	0	0	1
SDI	0.84	0.35	

a) Use Simpson's diversity index (SDI) to calculate the biodiversity of reef C. Show your working. *[2 marks]*

$$\text{SDI} = 1 - \left(\frac{\Sigma n(n-1)}{N(N-1)} \right)$$

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b) Compare the diversity of the three reefs. *[3 marks]*

Similarity: _____

_____

_____

Difference: _____

_____

_____

Significance: _____

_____

_____

QUESTION 24 (3 marks)

Under La Niña conditions, there is a greater temperature contrast between the eastern and western tropical Pacific Ocean than under normal conditions.

a) Identify one effect this scenario has for weather conditions on Australia's east coast. *[1 mark]*

_____

_____

b) Describe an impact on a local marine environment associated with the effect from Question 24a). *[2 marks]*

_____

_____

_____

_____

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QUESTION 25 (5 marks)

Representative concentration pathways (RCPs) are greenhouse gas concentration trajectories that describe different climate futures depending on the volume of greenhouse gases emitted in future years.

The graphs show long-term changes in ocean pH and hydrogen ion concentration $[H^+]$ using historical observations and modelled predictions using RCP scenarios between 1770 and 2100.

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a) Which RCP scenario predicts that ocean pH will stabilise? *[1 mark]*

b) Explain the relationship between $[H^+]$ and ocean pH using evidence from the graphs. *[2 marks]*

c) Describe two consequences for coral reef ecosystems under the RCP 8.5 scenario. *[2 marks]*

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QUESTION 26 (3 marks)

The stock of a wild migratory Australian fish species needs sustainable management before being used as a commercial resource. However, there is little scientific data about the species' behaviours and distribution.

a) Explain how the precautionary principle applies to this situation. *[1 mark]*

b) Explain one management technique that should be implemented to prevent overexploitation of this resource. *[2 marks]*

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QUESTION 27 (2 marks)

Explain low feed conversion ratio and why it is a desirable attribute for an aquaculture species.

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ADDITIONAL PAGE FOR STUDENT RESPONSES

Write the question number you are responding to.

Do not write outside this box.

ADDITIONAL PAGE FOR STUDENT RESPONSES

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ADDITIONAL PAGE FOR STUDENT RESPONSES

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References

Question 25

Adapted from Jiang, L-Q, Carter, B, Feely, R, Lauvset, S & Olsen, A 2019, Figure 5: *Long-term change of global surface ocean pH and ocean acidity* in 'Surface ocean pH and buffer capacity: past, present and future', *Scientific Reports*, vol. 9, issue 18624, CC BY 4.0, https://doi.org/10.1038/s41598-019-55039-4