Marine Science 2025 v1.2

IA1: Sample marking scheme

July 2025

Data test (10%)

This sample has been compiled by the QCAA to model one possible approach to allocating marks in a data test. It matches the examination mark allocations as specified in the syllabus (~ 30% apply understanding, ~ 30% analyse data and ~ 40% interpret evidence) and ensures that a balance of the objectives are assessed.

Assessment objectives

This assessment instrument is used to determine student achievement in the following objectives:

2. Apply understanding of the reef and beyond or changes on the reef to given algebraic, visual or graphical representations of scientific relationships and data to determine unknown scientific quantities or features.
3. Analyse data about the reef and beyond or changes on the reef to identify trends, patterns, relationships, limitations or uncertainty in datasets.
4. Interpret evidence about the reef and beyond or changes on the reef to draw conclusions based on analysis of datasets.

Note: Objectives 1, 5 and 6 are not assessed in this instrument.

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For all Queensland schools

Instrument-specific marking guide (IA1): Data test (10%)

Data test	Cut-off	Marks
The student response has the following characteristics:		
• consistent demonstration, across a range of scenarios, of – selection and correct application of scientific concepts, theories, models and systems to predict outcomes, behaviours and implications – correct calculation of quantities through the use of algebraic, visual and graphical representations of scientific relationships and data – correct and appropriate use of analytical techniques to correctly identify trends, patterns, relationships, limitations and uncertainty – correct interpretation of evidence to draw valid conclusions	> 90%	10
	> 80%	9
• consistent demonstration of – selection and correct application of scientific concepts, theories, models and systems to predict outcomes, behaviours and implications – correct calculation of quantities through the use of algebraic, visual and graphical representations of scientific relationships and data – correct use of analytical techniques to correctly identify trends, patterns, relationships, limitations and uncertainty – correct interpretation of evidence to draw valid conclusions	> 70%	8
	> 60%	7
• adequate demonstration of – selection and correct application of scientific concepts, theories, models and systems to predict outcomes, behaviours and implications – correct calculation of quantities through the use of algebraic, visual and graphical representations of scientific relationships and data – correct use of analytical techniques to correctly identify trends, patterns, relationships, limitations and uncertainty – correct interpretation of evidence to draw valid conclusions	> 50%	6
	> 40%	5
• demonstration of elements of – selection correct application of scientific concepts, theories, models and systems to predict outcomes, behaviours and implications – correct calculation of quantities through the use of algebraic, visual or graphical representations of scientific relationships or data – correct use of analytical techniques to correctly identify trends, patterns, relationships, limitations or uncertainty – correct interpretation of evidence to draw valid conclusions	> 30%	4
	> 20%	3
• demonstration of elements of – application of scientific concepts, theories, models or systems to predict outcomes, behaviours or implications – calculation of quantities through the use of algebraic or graphical representations of scientific relationships and data – use of analytical techniques to identify trends, patterns, relationships, limitations or uncertainty – interpretation of evidence to draw conclusions.	> 10%	2
	> 1%	1
The student response does not match any of the descriptors above.		0

Task

See IA1 sample assessment instrument: Data test (10%) (available on the QCAA Portal).

Sample marking scheme

Criterion	Marks allocated	Provisional marks
Data test Assessment objectives 2,3,4	10	—
Total	**10**	**—**

Marking scheme symbols and abbreviations

Symbol or abbreviation	Meaning
✓	The preceding section of the expected response is worth one mark.
/	Separates acceptable alternative wordings in the expected response.
()	Terms in brackets are not necessary in the response for the mark to be awarded.
shaded and underlined text	Shaded and underlined text must be included in the response for the mark to be awarded.
Accept converse.	Award the mark even if the answer is stated in its converse form, e.g. 'A comes before B' can be stated as 'B comes after A'.
Accept *min–max*.	Award the mark for any numerical answer that falls within the specified range, e.g. 'Accept 1.5–1.9' means that any answer between 1.5 and 1.9 should be considered correct. This is used in questions that involve a multi-step calculation where differences in rounding in the intermediate steps could result in slight differences in the final answer.
Allow for FT error …	Means 'allow for follow-through error'. Initial errors should only be penalised once. Marks should be awarded for subsequent steps that are correct.
Allow FT error for transcription only.	Follow-through error is only allowed if the student has written down information incorrectly but processed it correctly.
AND	Separates two parts of the response that are both required for the mark to be awarded.
Max. # marks.	The maximum number of marks that can be awarded for the response is indicated by #.
OR	Separates acceptable alternative wordings.
OWTTE	Means 'or words to that effect'. This is used in questions where students are unlikely to use the exact wording given in the expected response. If the student's response has the same meaning as the expected response, then the mark should be awarded.
Working not required.	Evidence of working, reasoning or calculations is not required for the mark to be awarded.

The annotations are written descriptions of the expected response for each question and are related to the assessment objectives.

Assessment objective — annotation	Expected response Note: ✓ = 1 mark	Mark allocation
Question 1		**2 marks**
Apply understanding The question uses the cognitive verb 'determine'. The expected response is an unknown scientific quantity.	a. Accept values between 42 and 43%.✓ b. Accept values between 4 and 4.5 m.✓	1 mark for correct percentage. 1 mark for correct quantity.
Question 2		**4 marks**
Analyse data The question uses the cognitive verb 'identify. The expected response identifies a relationship.	a. Positive linear trend/strong, positive correlation (r = 0.936).✓ As macroalgal cover (%) increases the percentage of corals with direct algal competition increases.✓ b. Inverse relationship/logarithmic/natural logarithm.✓ Macroalgal cover increases (steeply) with declining water clarity/Secchi depth/at values < 13 m.✓	1 mark for identifying the graphical relationship. 1 mark for identifying the scientific relationship. 1 mark for identifying the graphical relationship. 1 mark for identifying the scientific relationship. Accept converse.
Question 3		**1 mark**
Apply understanding The question uses the cognitive verb 'identify'. The expected response is an unknown scientific quantity.	Accept values between 180 and 200 cm.✓	1 mark for correct quantity.
Question 4		**2 marks**
Interpret evidence The question uses the cognitive verb 'determine'. The expected response draws conclusions based on analysis.	Site C shows a greater change in diversity over time.✓ Each group, *Acropora, Montipora, Turbinaria* and Other have all been the most abundant group at one point, which has changed 6 times. Site A, B and D have been mainly *Acropora*. ✓	1 mark for identifying Site C. 1 mark for evidence. Accept appropriate evidence to support an alternate site.
Question 5		**2 marks**
Interpret evidence The question uses the cognitive verb 'infer'. The expected response draws conclusions based on analysis.	*Acropora*✓ The relative mass abundance of Acropora has increased since the 1850 threshold at all sites.✓	1 mark for identifying *Acropora.* 1 mark for supporting evidence. Accept converse.

Assessment objective — annotation	Expected response Note: ✓ = 1 mark	Mark allocation
Question 6		**2 marks**
Analyse data The question uses the cognitive verb 'contrast'. The expected response identifies relationships.	For FF, the difference between the mean number of individual coral colonies in Site A and Site B (14) is greater than the difference for AH (2).✓ For FF, mean in Site A is greater than (>) the mean in Site B. Whereas, for AH, mean in Site A is less than (<) the mean in Site B.✓	1 mark for contrasting the size of the difference between Site A and Site B. 1 mark for contrasting whether mean in Site A is greater or less than mean in Site B. Accept converse.
Question 7		**2 marks**
Interpret evidence The question uses the cognitive verb 'draw conclusions'. The expected response draws conclusions based on analysis.	The difference in distribution for SP is more likely to be due to chance than the differences in distribution for all other species.✓ This is because p<0.001 is lower than p<0.05.✓	1 mark for correct conclusion about relative probability of differences in distribution. Accept converse. 1 mark for reasons. Accept converse.
Question 8		**3 marks**
Apply understanding The question uses the cognitive verb 'calculate'. The expected response is an unknown scientific quantity.	N = 35✓ $\text{SDI} = 1 - \frac{0 \times -1 + 11 \times 10 + 21 \times 20 + 3 \times 2}{35 \times 34}$✓ SDI = 0.55✓	1 mark for calculation of N. 1 mark for correct substitution of values into formula. 1 mark for correct SDI value. Correct d.p. required. Allow FT error for transcription only.
Question 9		**2 marks**
Interpret evidence The question uses the cognitive verb 'infer'. The expected response draws conclusions based on analysis.	(SDI represents the probability that two individuals randomly selected from a sample will belong to different species.) Probability (different) = 0.55 / 55% / $\frac{55}{100}$✓ Probability (same) = 1 – Probability (different) = 0.45 / 45% / $\frac{45}{100}$✓	No marks for recalling definition of SDI. 1 mark for interpreting $SDI_{Site\ B}$ as the probability that coral are from different species. Allow for FT error from Question 8. 1 mark for determining the probability of species being the same. Working not required. Allow for FT error from Question 8.