Marine Science 2019 v1.1

IA1 sample assessment instrument
April 2018

Data test (10%)

This sample has been compiled by the QCAA to assist and support teachers in planning and developing assessment instruments for individual school settings.

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

3. analyse evidence 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, 6 and 7 are not assessed in this instrument.

CORALWATCH

THE UNIVERSITY OF QUEENSLAND
AUSTRALIA

Subject	Marine Science	Instrument no.	IA1
Technique	Data test		
Unit	Unit 3: Marine systems — connections and change		
Topic	Not Specific		

Conditions			
Response type	Short response Supervised exam conditions		
Time	60 minutes	**Perusal**	10 minutes

Other	• Length: up to 500 words in total, consisting of
	  – short responses, i.e. sentence or short paragraphs
	  – written paragraphs, 50–250 words per item
	  – other types of item responses, e.g. interpreting and calculating, should allow students to complete the response in the set time
	• Queensland-approved graphics calculator permitted
	• Unseen stimulus		

Instructions			
Use the datasets to respond to the associated items in the spaces provided. Each item is associated with the dataset that immediately precedes it.			

Criterion	Marks allocated	Result
Data test Assessment objectives 2, 3, 4	10	
Total	**10**	

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Data test summary

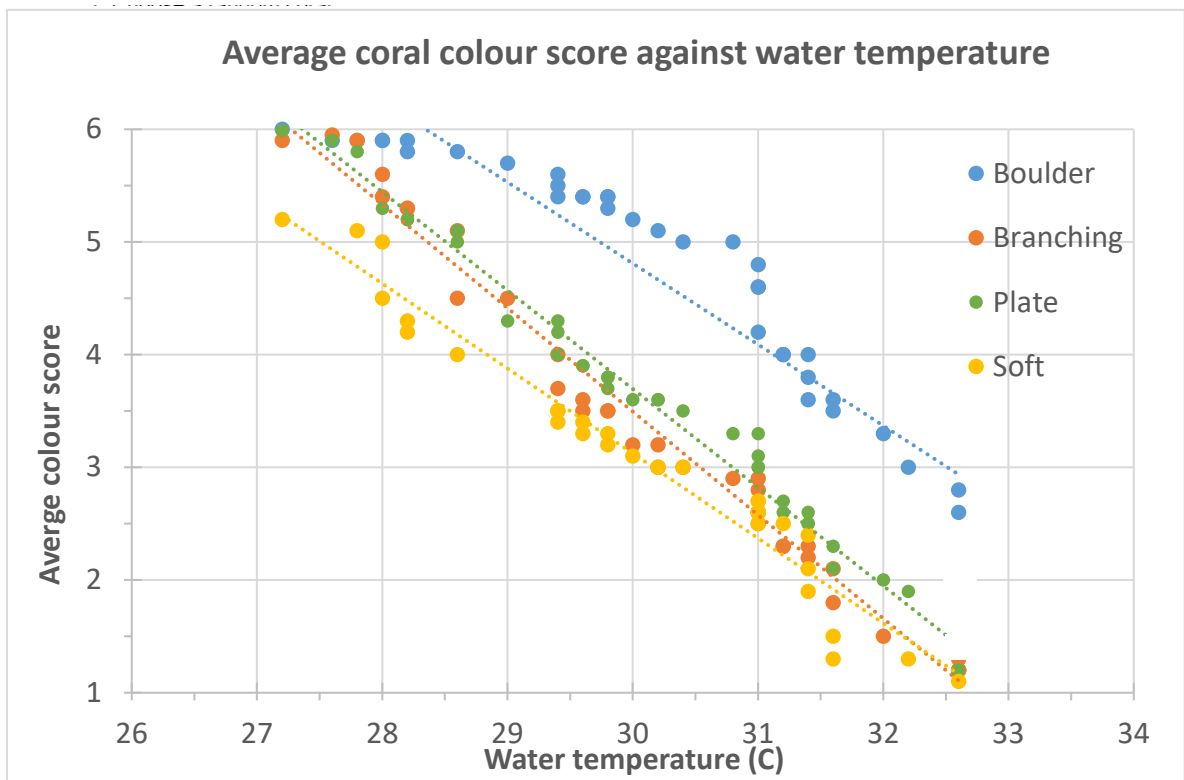| Dataset	Item	Apply understanding	Analyse evidence	Interpret evidence	
1	1	2			
	2		2		
	3			2	
2	4		2		
	5			2	
	6			2	
	7	2			
3	8	2			
	9		2		
	10			2	
Total		**6**	**6**	**8**	**20**
Percentage		**30%**	**30%**	**40%**	**100%**

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Coral Health Chart

Students used the colour chart in Figure 1 to record the health of different types of corals. On a scale of 1 (bleached) to 6 (healthy) the average coral colour score is plotted against temperature in Graph1.

Figure 1

Bleached boulder coral
Colour code: B1
Coral type: BO

Healthy boulder coral
Colour code: E4
Coral type: BO

Bleached branching coral
Colour code: E1 Coral type: BR

Healthy branching coral
Colour code: D4 Coral type: BR

Graph 1

Average coral colour score against water temperature

Source: https://www.coralwatch.org/web/guest;jsessionid=BE64714E7EAA93A2FA3ECB9845DAE5BD
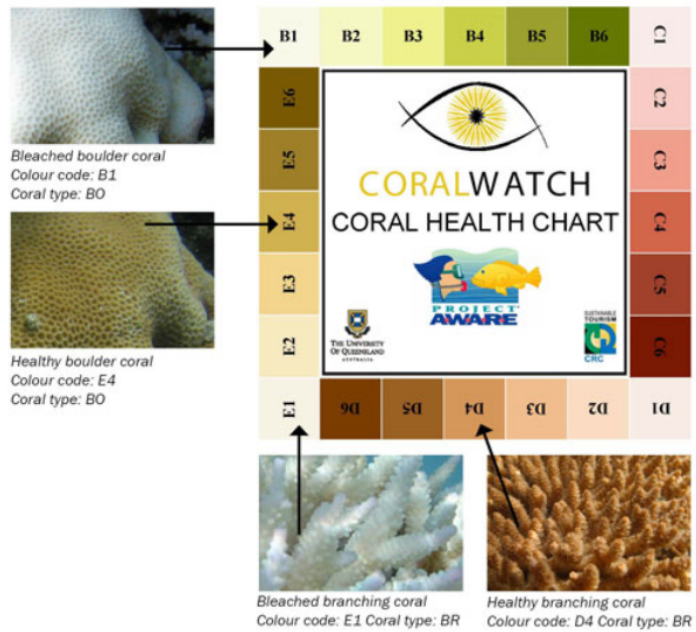
Item 1 (apply understanding) 2 marks

Determine the:

    a. average colour score of a plate coral at 28.5 degrees Celsius (to 1 decimal place).

> Answer:
> (1 decimal place)

    b. temperature at which soft coral has an average colour score of 2 (to 1 decimal place).

> Answer: ^{0}C
> (1 decimal place)

Item 2 (analyse evidence) 2 marks

Identify the relationship between coral colour score and temperature:

_____

_____

Item 3 (interpret evidence) 2 marks

Predict the relative bleaching of plate coral and boulder coral at 33 degrees Celsius. Give reasons for your prediction.

_____

_____

_____

_____

_____

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Dataset 2

Acropora Sp.

The growth rate of 3 different species of _Acropora_ coral was measured in centimetres per year at two reef locations. Reef A was 50 metres from a dredged channel, reef B was 5 km from a dredged channel.

The growth rates measured are presented in the table below along with the calculated P-Values for the data sets for each coral species.

Acropora Sp.	Reef A Growth (cm per year)	Reef B Growth (cm per year)	P-Value
1	10	15	0.1
2	12	16	0.01
3	8	10	0.001

Source: University of Queensland

Item 4 (apply understanding)   **2 marks**

Determine which _Acropora Sp._ shows the least difference in growth rate between reef A and reef B. Give reasons for your answer

Species Number _____

Calculate the difference in the average annual growth rate for all corals on Reef A and Reef B. Show your working.

Answer:
cm/year

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Item 5 (analyse evidence)   **2 marks**

Contrast the growth rate of the three *Acropora* species at Reef A and Reef B.

Item 6 (interpret evidence)   **2 marks**

Infer from the table above what affect dredging has on species 1 and species 3. Give reasons for your answer.

Species 1.

_____

_____

Species 3.

_____

_____

Item 7 (interpret evidence)   **2 marks**

Draw a conclusion about what the different P-Values show with regard to the effects of dredging on Species 2 and Species 3. Give reasons for your conclusion.
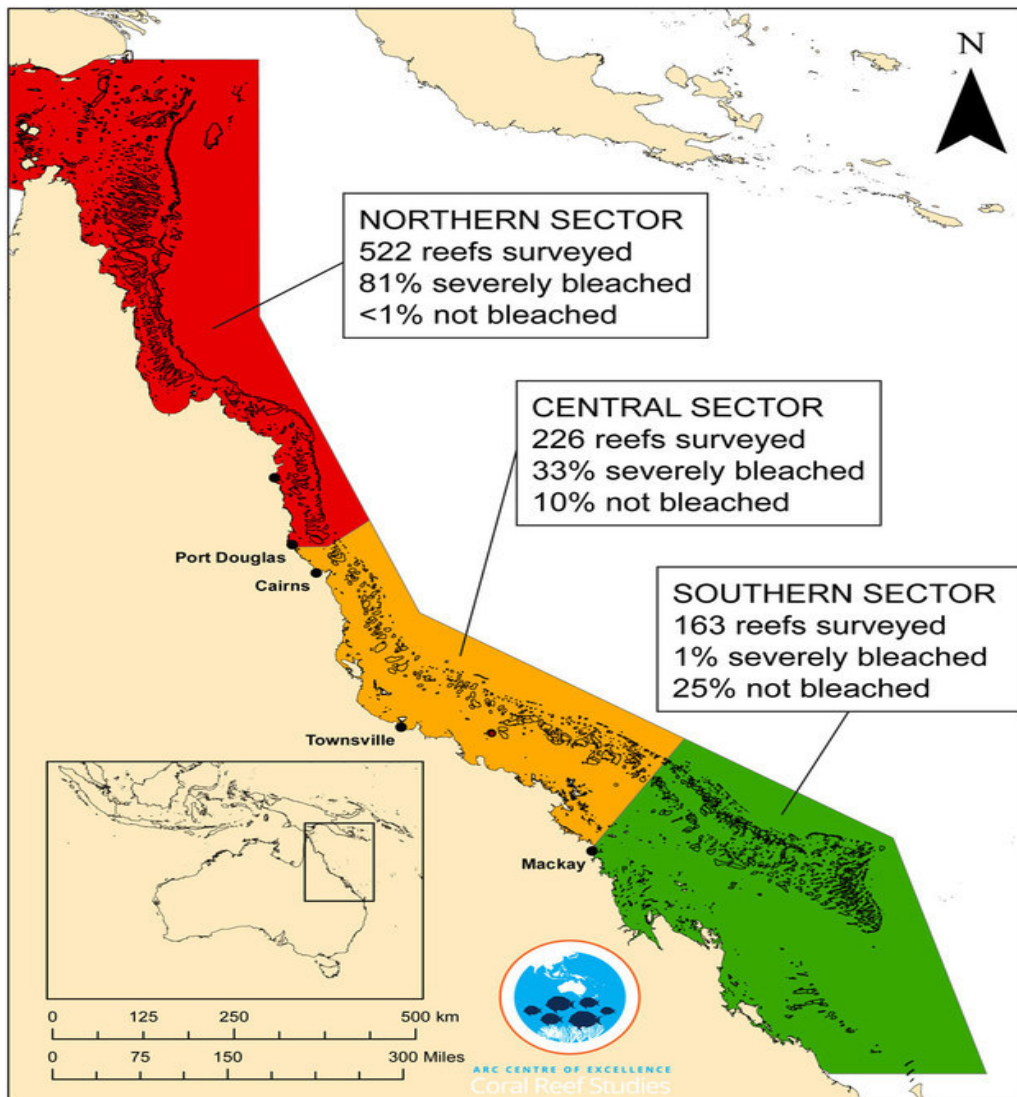
_____

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Figure 2.

Map of the Great Barrier Reef showing results of aerial surveys on reefs affected by the 2016 coral bleaching event- JCU

N

NORTHERN SECTOR
522 reefs surveyed
81% severely bleached
<1% not bleached

CENTRAL SECTOR
226 reefs surveyed
33% severely bleached
10% not bleached

Port Douglas
Cairns

SOUTHERN SECTOR
163 reefs surveyed
1% severely bleached
25% not bleached

Townsville

Mackay

| 0 | 125 | 250 | 500 km |
| 0 | 75 | 150 | 300 Miles |

ARC CENTRE OF EXCELLENCE
Coral Reef Studies

Item 8 (apply understanding)	**2 marks**

Calculate the following:

a. The % of all surveyed reefs that were severely bleached. Show your working.

Answer:

_____%

b. The number of reefs not bleached in the Southern and Central Sectors.

Answer:

| Item 9 (analyse evidence) | 2 marks |

Contrast the % of reefs severely bleached and not bleached across the 3 sectors.

_____

_____

_____

_____

_____

_____

| ITEM 10 (interpret evidence) | 2 marks |

Draw a conclusion about why the levels of severely bleached corals differ across the three survey regions. Give reasons for your conclusion.

_____

_____

_____

_____

_____

_____

END OF PAPER

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Instrument-specific marking guide (ISMG)

Criterion: Data test

Assessment 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

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The student work has the following characteristics:	Cut-off	Marks
• consistent demonstration, across a range of scenarios about the reef and beyond or changes on the reef, of – selection and correct application of scientific concepts, theories, models and systems to predict outcomes, behaviours and implications	> 90%	10
– 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.	> 80%	9
• consistent demonstration, in scenarios about the reef and beyond or changes on the reef, of – selection and correct application of scientific concepts, theories, models and systems to predict outcomes, behaviours and implications	> 70%	8
– 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.	> 60%	7
• adequate demonstration, in the reef and beyond or changes on the reef, 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	> 50%	6
– correct use of analytical techniques to correctly identify trends, patterns, relationships, limitations and uncertainty – correct interpretation of evidence to draw valid conclusions.	> 40%	5
• demonstration, in scenarios about the reef and beyond or changes on the reef, of elements of – selection and correct application of scientific concepts, theories, models and systems to predict outcomes, behaviours and implications	> 30%	4

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	Cut-off	Marks
– 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.	> 20%	3
The student work has the following characteristics:	**Cut-off**	**Marks**
• demonstration, in scenarios about the reef and beyond or changes on the reef, of elements of – application of scientific concepts, theories, models or systems to predict outcomes, behaviours or implications	> 10%	2

– 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.
	> 1%	1

• does not satisfy any of the descriptors above.	≤ 1%	0