LUI ☐☐☐☐☐☐☐☐☐☐ Venue code ☐☐☐☐

School name ☐

Given name/s ☐

Family name ☐

Attach your
barcode ID label here

Sample assessment 2020

Marine Science

Paper 2

Time allowed

- Perusal time — 10 minutes

- Working time — 90 minutes

General instructions

- Answer all questions in this question and response book.

- Write in black or blue pen.

- QCAA-approved calculator permitted.

- Planning paper will not be marked.

Section 1 (40 marks)

- 15 short response questions

Queensland Government | QCAA Queensland Curriculum & Assessment Authority

Section 1

Instructions

- 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 …
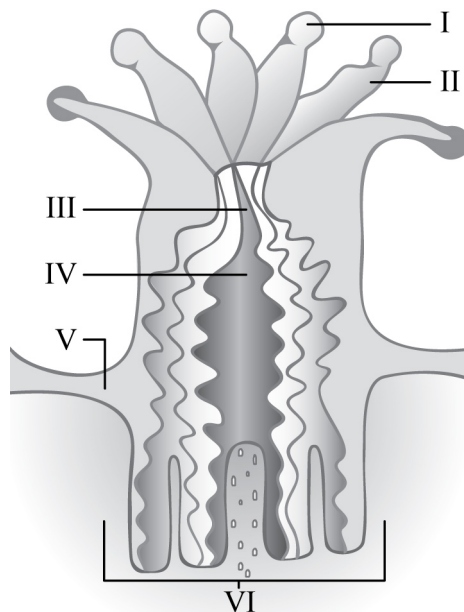   - If you do not do this, your original response will be marked.

QUESTION 1 (1 mark)

Complete the following sentence:

Corals first appeared within Australian waters approximately _____ million years ago.

QUESTION 2 (2 marks)

The diagram below shows a generalised coral polyp.

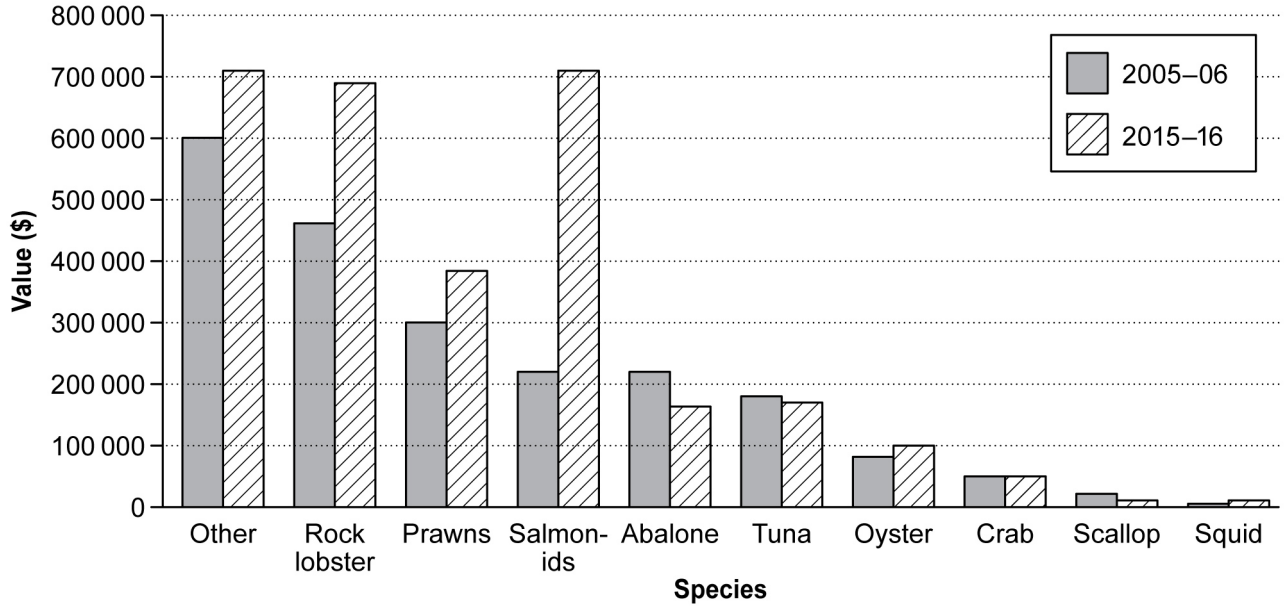
Identify the label on the diagram that represents the following anatomical features:

- corallite: _____

- coelenteron: _____

QUESTION 3 (4 marks)

Over the past 10 years, aquaculture has been increasingly used to produce seafood for Australian and export markets. The figure below shows the gross value of aquaculture production in Australia for 2005–06 and 2015–16.

Identify two trends shown in the data and give reasons for the associated value of aquaculture production in Australia.

1. _____

_____

_____

_____

_____

2. _____

_____

_____

_____

QUESTION 4 (3 marks)

A technique of rearing *Acropora millepora* (branching, stony coral) was investigated. It was found that larvae reared at the lowest stocking density had 15 times greater settlement success than those at the highest stocking density.

Explain how larval settlement of *A. millepora* is influenced by larval stocking density.

_____

_____

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QUESTION 5 (3 marks)

The oceans surrounding Australia have relatively small upwellings due to the dampening effects of its four major currents.

Explain how El Niño's effect on the East Australian Current affects the distribution of Australia's fish populations and associated primary productivity.

_____

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QUESTION 6 (4 marks)

A fish survey of four reef habitat areas and three mangrove habitat areas was conducted. The aim was to determine the mangrove habitat with the highest level of connectivity for juvenile and adult reef fish. The mangrove habitats were ranked on their nursery function.

Mangrove habitat area	Reef habitat area number				Overall connectivity to coral reefs
	I	II	III	IV	
	Number of juvenile fish in location				
A	13	13	13	13	52
B	0	52	0	0	52
C	68	5	56	67	196
Overall connectivity to mangrove habitat	81	70	69	80	

Using the information above, identify which mangrove habitat would be the most crucial in this situation. Give reasons to support your response.

_____

_____

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QUESTION 7 (2 marks)

A mass coral bleaching event in 1998 caused a decline in average coral cover for a reef.

Identify an implication for the fish populations associated with this reef. Give a reason for your response.

_____

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QUESTION 8 (2 marks)

    a)   Describe a significant anthropogenic source of carbon dioxide in the atmosphere.   _[1 mark]_

_____

_____

    b)   Describe one effect that an increase in carbon dioxide has on ocean chemistry.   _[1 mark]_

_____

_____

_____

QUESTION 9 (2 marks)

a) Identify one point of difference between small-scale ocean acidification studies in
    aquaria and those conducted in the field.   *[1 mark]*

_____

_____

_____

b) Identify what aquaria-based experiments demonstrate about ocean acidification.   *[1 mark]*

_____

_____

_____

QUESTION 10 (3 marks)

Describe three ways in which coral reefs benefit from herbivorous fish.
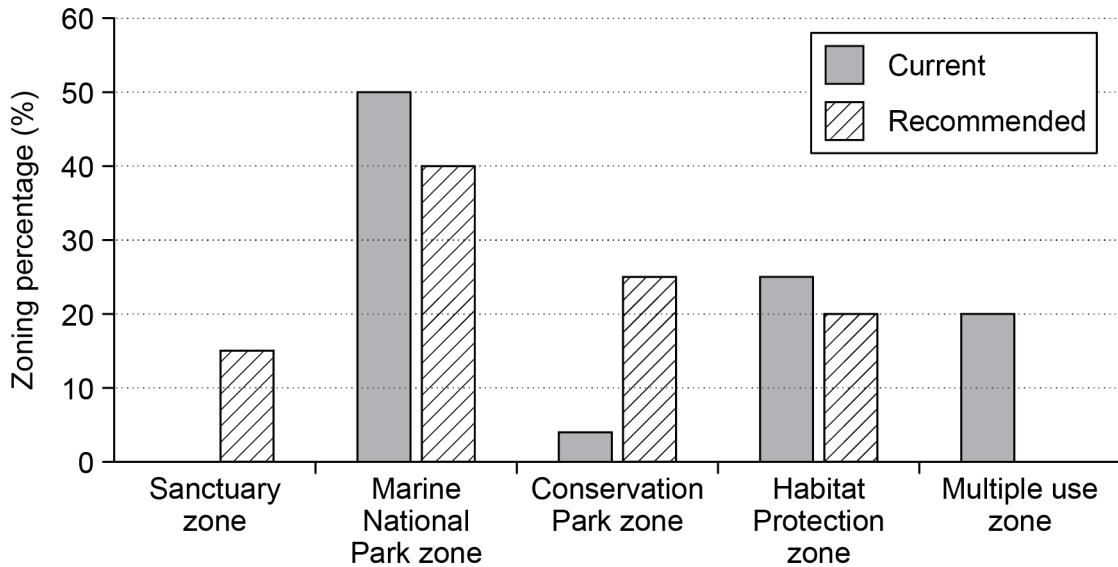
1. _____

_____

_____

2. _____

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3. _____

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_____

QUESTION 11 (4 marks)

A recent review of zoning in the Coral Sea Commonwealth Marine Reserve (CMR) recommended adjusting the zoning percentages as shown in the figure below. The introduction of a sanctuary zone would prohibit all activities and prevent access to the area from both commercial and recreational users.

Identify two strengths and two limitations of the recommended zoning changes within the Coral Sea CMR.

Strengths:

1. _____

_____

2. _____

_____

Limitations:

1. _____

_____

2. _____

_____

QUESTION 12 (3 marks)

A study of three isolated offshore reef marine protected areas in subtropical East Australia was conducted. The study provided mitochondrial and microsatellite data in an endemic species of anemone fish, *Amphiprion mccullochi*. This data was used to infer gene flow and levels of population replenishment. The research found that, over evolutionary time, this species had high levels of gene flow and genetic diversity. However, the current anemone fish population had limited gene flow and species replenishment.

Explain the connectivity between the offshore reef ecosystems and the role this plays in the anemone fish's replenishment.

_____

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QUESTION 13 (2 marks)

Identify two features of current commercial aquaculture that limit its ability to address food security.

1. _____

_____

_____

2. _____

_____

_____

QUESTION 14 (2 marks)

Describe two factors that affect the probability that a reef will recover from a bleaching event.

1. _____

_____

_____

2. _____

_____

_____

QUESTION 15 (3 marks)

The figure below shows the Northern Prawn Fishery data for blue endeavour prawn spawning stock biomass (SSB) and spawning stock biomass at maximum economic yield (SB$_{MEY}$).

The timeline of implementation of a management plan is shown below:

- 1977 — first management plan
- 1987 — mid-season closure with restrictions
- 2000 — target set for a spawning stock biomass that produces maximum sustainable yield (MSY)
- 2004 — target set for a spawning stock biomass that produces maximum economic yield (MEY)
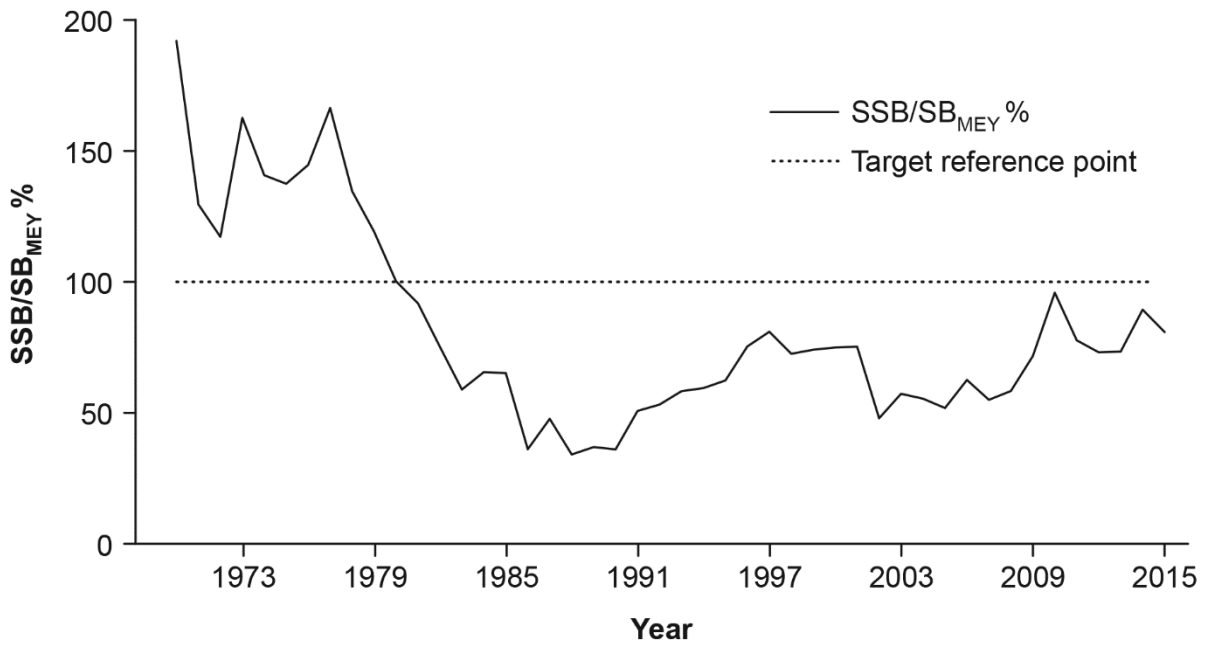
From the above information, appraise the adoption of the maximum economic yield model for this fishery.

_____

_____

_____

_____

_____

END OF PAPER

ADDITIONAL PAGE FOR STUDENT RESPONSES

Write the question number you are responding to.

ADDITIONAL PAGE FOR STUDENT RESPONSES

Write the question number you are responding to.

References

Question 2

Figure derived from MarkusZi 2012, 'Coral polyp de',
https://commons.wikimedia.org/wiki/File:Coral_polyp_de.svg.

Question 3

Graph derived from Australian Bureau of Agricultural and Resource Economics and Sciences 2016,
Australian fisheries and aquaculture statistics 2016,
www.agriculture.gov.au/SiteCollectionDocuments/abares/publications/
AustFishAquacStats_2016_v1.0.0.pdf.

Question 6

Data derived from Mumby, PJ 2006, 'Connectivity of reef fish between mangroves and coral reefs:
Algorithms for the design of marine reserves at seascape scales', *Biological Conservation*, vol. 128,
issue 2, pp. 215–222, www.semanticscholar.org/paper/Connectivity-of-reef-fish-between-mangroves-
and-for-Mumby/cbb80a0dc34c70eae37351eb0fba6b3c2ae772d1/figure/3.

Question 11

Graph derived from Buxton, CD & Cochrane, P 2015, 'Commonwealth Marine Reserves Review: Report
of the Bioregional Advisory Panel', Department of the Environment, Table 4.5.1, pp. 200–201,
https://parksaustralia.gov.au/marine/pub/review/cmr-review-bioregional-advisory-panel-report-final-
high-res-maps.pdf.

Question 15

Graph derived from Australian Bureau of Agricultural and Resource Economics and Sciences 2017,
'Fishery status report 2017', Figure 5.10, p. 76, https://apo.org.au/sites/default/files/resource-
files/2017/09/apo-nid112431-1235671.pdf.

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