



## Cambridge International AS & A Level

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**MARINE SCIENCE**

**9693/01**

Paper 1 AS Structured Questions

**October/November 2020**

MARK SCHEME

Maximum Mark: 75

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**Published**

This mark scheme is published as an aid to teachers and candidates, to indicate the requirements of the examination. It shows the basis on which Examiners were instructed to award marks. It does not indicate the details of the discussions that took place at an Examiners' meeting before marking began, which would have considered the acceptability of alternative answers.

Mark schemes should be read in conjunction with the question paper and the Principal Examiner Report for Teachers.

Cambridge International will not enter into discussions about these mark schemes.

Cambridge International is publishing the mark schemes for the October/November 2020 series for most Cambridge IGCSE™, Cambridge International A and AS Level and Cambridge Pre-U components, and some Cambridge O Level components.

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This document consists of **11** printed pages.

**PUBLISHED****Generic Marking Principles**

These general marking principles must be applied by all examiners when marking candidate answers. They should be applied alongside the specific content of the mark scheme or generic level descriptors for a question. Each question paper and mark scheme will also comply with these marking principles.

**GENERIC MARKING PRINCIPLE 1:**

Marks must be awarded in line with:

- the specific content of the mark scheme or the generic level descriptors for the question
- the specific skills defined in the mark scheme or in the generic level descriptors for the question
- the standard of response required by a candidate as exemplified by the standardisation scripts.

**GENERIC MARKING PRINCIPLE 2:**

Marks awarded are always **whole marks** (not half marks, or other fractions).

**GENERIC MARKING PRINCIPLE 3:**

Marks must be awarded **positively**:

- marks are awarded for correct/valid answers, as defined in the mark scheme. However, credit is given for valid answers which go beyond the scope of the syllabus and mark scheme, referring to your Team Leader as appropriate
- marks are awarded when candidates clearly demonstrate what they know and can do
- marks are not deducted for errors
- marks are not deducted for omissions
- answers should only be judged on the quality of spelling, punctuation and grammar when these features are specifically assessed by the question as indicated by the mark scheme. The meaning, however, should be unambiguous.

**GENERIC MARKING PRINCIPLE 4:**

Rules must be applied consistently, e.g. in situations where candidates have not followed instructions or in the application of generic level descriptors.

**GENERIC MARKING PRINCIPLE 5:**

Marks should be awarded using the full range of marks defined in the mark scheme for the question (however; the use of the full mark range may be limited according to the quality of the candidate responses seen).

**GENERIC MARKING PRINCIPLE 6:**

Marks awarded are based solely on the requirements as defined in the mark scheme. Marks should not be awarded with grade thresholds or grade descriptors in mind.

This mark scheme will use the following abbreviations:

<b>;</b>	separates marking points
<b>/</b>	separates alternatives within a marking point
<b>()</b>	contents of brackets are not required but should be implied / the contents set the context of the answer
<b>R</b>	reject
<b>A</b>	accept (answers that are correctly cued by the question or guidance you have received)
<b>I</b>	ignore (mark as if this material was not present)
<b>AW</b>	alternative wording (where responses vary more than usual, accept other ways of expressing the same idea)
<b>AVP</b>	alternative valid point (where a greater than usual variety of responses is expected)
<b>ORA</b>	or reverse argument
<b><u>underline</u></b>	actual word underlined must be used by the candidate (grammatical variants excepted)
<b>MAX</b>	indicates the maximum number of marks that can be awarded
<b>+</b>	statements on both sides of the + are needed for that mark
<b>OR</b>	separates two different routes to a mark point and only one should be awarded
<b>ECF</b>	error carried forward (credit an operation from a previous incorrect response)

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Question	Answer	Marks
1(a)	<i>any two of:</i> no / less, rain ; no / less, windspeed ; lower air pressure ; no / less, cloud ;	<b>2</b>
1(b)	X on the sea below the eye ;	<b>1</b>
1(c)	arrow starting at sea level and rising up the outside of the eye ; arrow going from the eye pointing to the edge of the cyclone ;	<b>2</b>
1(d)	<i>any three of:</i> high / warm, sea <u>surface</u> temperature / water at least, 26.5 °C / 80 °F ; high humidity ; low wind shear ; deep water / water over 50 m deep ; <b>AVP</b> ;;;	<b>3</b>
1(e)	evaporation ; condensation ;	<b>2</b>

Question	Answer	Marks
2(a)(i)	<i>any three of:</i> little evidence that longer length means more parasites ; large overlap of length of fish with and without signs of parasitism ; (but) evidence of parasitism in fish above 196 mm (in length) ; no evidence if parasitism in fish below 88 mm ; number of fish, above 196 mm / below 88 mm, (in length) not known ;	<b>3</b>

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Question	Answer	Marks
2(a)(ii)	<p><i>any three of:</i>            parasite uses fish nutrients ;            fish has less energy ;            fish are in, poor health / weaker ;            so swims more slowly ;            alters behaviour (so more likely to be predated on) ;  <i>idea of</i> less streamlined ;            causes blindness ;            harms fish gills / reduces ability to, ventilate / respire ;</p>	<b>3</b>
2(b)	<p>both organisms benefit ;            zooxanthellae photosynthesises ;            zooxanthellae provide, glucose / oxygen / nutrients / energy, for coral ;            coral provide, shelter / substrate / habitat / protection, for zooxanthellae ;</p>	<b>3</b>
2(c)(i)	1994 / 1998 / 2006 / 2010 / 2012 ;	<b>1</b>
2(c)(ii)	<p><i>any three of:</i>            small overall increase in sea surface temperature ;            fluctuations in sea surface temperature ;            fluctuations increase in size ;            relevant data manipulation ;</p>	<b>3</b>
2(c)(iii)	<p><i>any two of:</i>            pollution ;            sedimentation ;            named mechanical damage ;            storm damage ;            predation / named example of predation ;            disease ;            desiccation ;            ocean acidification / increase in carbon dioxide concentration ;            abrasion by sediments ;</p>	<b>2</b>

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Question	Answer	Marks
2(d)	<i>any two of:</i> carbon dating ; geomorphologic analysis ; drilling / analysis, of core samples ;	<b>2</b>

Question	Answer	Marks
3(a)	algae ;	<b>1</b>
3(b)	snails / small fish ;	<b>1</b>
3(c)	2 / second ;	<b>1</b>
3(d)(i)	12 538 (kJ m <sup>-2</sup> yr <sup>-1</sup> ) ;	<b>1</b>
(d)(ii)	<i>any three of:</i> energy lost, as heat / in respiration ; energy required for, movement / growth / metabolic processes ; not all the organism is, eaten / digested ; energy lost in, excretion / egestion / faeces ;	<b>3</b>
3(e)	<i>any three of:</i> increase in light energy available (from the Sun) ; more photosynthesis ; increased productivity ; more energy <u>available</u> for the rest of the food chain ;	<b>3</b>
3(f)(i)	<i>any two of:</i> captures chemical energy of dissolved minerals ; and makes (energy) available to the rest of the food chain ; <b>AVP</b> ;	<b>2</b>
3(f)(ii)	named example / chemosynthetic bacteria (in hydrothermal vents) ;	<b>1</b>

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Question	Answer	Marks
4(a)(i)	4.8 (m) ;	1
4(a)(ii)	day 20 ;	1
4(a)(iii)	8 ;	1
4(b)(i)	least difference between low and high tide / tidal range is smaller / neap tide ;	1
4(b)(ii)	<i>any two of:</i> wind direction ; wind, speed / strength ; air pressure ; size / volume, of body of water ; shape / morphology / configuration / geomorphology, of coastline ; slope / relief, of shore ;	2

Question	Answer	Marks
5(a)	<i>any two of:</i> greater erosion than sedimentation ; sediment removed by wave action ; rocky shores are exposed to <u>high</u> wave action ; leaving, more resistant / harder, rock ;	2
5(b)	<i>any two of:</i> river, erodes / carries / transports, sediment ; slow movement of water at mouth / little wave action ; deposition of sediment ; greater sedimentation than erosion ;	2



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Question	Answer	Marks
5(c)	<p>affects the distribution of organisms ;</p> <p><i>Max 3 of either air or wave action exposure to air</i></p> <p>organisms are exposed to fluctuating temperatures ;            organisms are at risk of dessication ;            organisms have to be adapted to these conditions / have a shell to retain water ;            organisms have ability to migrate ;</p> <p><i>exposure to wave action</i></p> <p>organisms are adapted to attach to a hard substrate ;            to prevent being washed away ;            organisms move into crevices ;            wave action brings in, resources / oxygen ;</p>	<b>4</b>

Question	Answer	Marks
6(a)(i)	<p><i>any four of:</i></p> <p>more producers, at the surface / between 0 m to 250 m ;  <u>most</u> (dissolved) oxygen in the surface layer ;            more light at surface ;            light needed for photosynthesis ;            photosynthesis produces oxygen ;</p>	<b>4</b>
6(a)(ii)	<p><i>any three of:</i></p> <p>concentration of dissolved oxygen increases ;            pressure increases with depth ;            oxygen <u>solubility</u> increases with pressure ;            increased pressure causes molecules to be closer together (increasing solubility) ;</p>	<b>3</b>

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Question	Answer	Marks
6(b)(i)	<i>any three of:</i> salinity increases with depth ; increased salinity increases density ; denser water sinks ; <b>A OR A</b> description of halocline ; high evaporation in tropical seas leads to increased salinity at surface ; high, precipitation / runoff, decreases salinity at surface ; ref to freezing at surface leading to increasing salinity ; <b>AVP ;</b>	<b>3</b>
6(b)(ii)	<i>any three of:</i> warm / high, temperature ; higher winds ; increased evaporation ; water is lost / salt is left behind ; no freshwater input from land ; little rainfall ;	<b>3</b>

Question	Answer	Marks
7(a)(i)	leaching / runoff ;	<b>1</b>
7(a)(ii)	upwelling ;	<b>1</b>
7(a)(iii)	<i>any three of:</i> population of marine fish decrease / decrease in fish reproduction ; less taken up by producers ; less, energy / nutrients, available in food chain / described ; phosphorus required for to make, bone / DNA / nucleic acids ;	<b>3</b>

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<b>Question</b>	<b>Answer</b>	<b>Marks</b>
7(b)	<i>any three of:</i> incorporated in coral reefs ; sink to the sea floor as, faeces / excretion ; sink to the sea floor due to death ; decay / decomposition, of, bodies / faeces ; incorporated into, rocks / rock formations ;	<b>3</b>