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**MARINE SCIENCE**

**9693/01**

Paper 1 AS Structured Questions

**October/November 2018**

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.

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This document consists of **12** 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.

Question	Answer	Marks	Guidance
1(a)	<p><i>any 3 of:</i>  low air pressure system ;    spinning / spiralling / circular wind motion / winds from different directions / correct reference to Coriolis effect ;    warm sea <u>surface</u> temperature ;  at least, 26.5 °C / 79.5 °F ;  depth of water at least 50–60 m ;  moist / humid, air ;  low wind shear / description of ;  ref. to sufficient distance from equator / 500 km / at least 5° latitude ;</p>	<b>3</b>	
1(b)	<p><i>any 3 of:</i>  ref. to an increases and then a decrease ;    rises to peak of 142 km per hour at 30 km ;    steep decrease followed by a, less steep decrease / levelling off <b>OR</b> increase is steeper than the decrease ;    decrease to 19 km per hour at 250 km ;    manipulated data ;</p>	<b>3</b>	

Question	Answer	Marks	Guidance
1(c)	<p><i>any 3 of:</i></p> <p>deaths ;</p> <p>disruption to ecosystem / disruption of food chains or webs ;</p> <p>flooding ;</p> <p>damage to infrastructure / named ;</p> <p>erosion of coastline / damage to, beaches / shores ;</p> <p>damage to <u>crops</u> ;</p> <p>AVP ;</p>	<b>3</b>	<p>e.g. houses / roads / harbour</p> <p>e.g. tourism / loss of fish stocks / economic issues</p>

Question	Answer	Marks	Guidance
2(a)(i)	<p><i>any 3 of:</i></p> <p>provides suitable substrate for attachment of organisms ;</p> <p>idea of, colonisation / succession ;</p> <p>provides, breeding site / nursery areas ;</p> <p>provides, shelter / protection, for juvenile and mature individuals ;</p> <p>allows food chains to develop ;</p>	<b>3</b>	
2(a)(ii)	<p>protects shore / existing reef ;</p> <p>AVP ;</p>	<b>1</b>	

Question	Answer	Marks	Guidance
2(a)(iii)	<p><i>any 2 of:</i> non-toxic ;</p> <p>durable / long lasting / inert ;</p> <p>dense ;</p> <p>rough surface ;</p>	<b>2</b>	
2(b)(i)	<p>large surface area ;</p> <p>voids / internal spaces / AW ;</p> <p>AVP ;</p>	<b>2</b>	
2(b)(ii)	<p><i>any 2 of:</i> substrate unstable / moves ;</p> <p>so, it is difficult to attach module to sea bed / module more easily shifted ;</p> <p>sediments cover reef ;</p>	<b>2</b>	
2(b)(iii)	<p><i>any 3 of:</i> may be in the same area, so same species of larvae present / attaching ;</p> <p>not enough difference in size to produce different habitats / niches ;</p> <p>these are resident species there may be differences in, visitor / transient, species that limits an increase in resident species / AW ;</p> <p>may change over longer time frame ;</p> <p>species in that area may be territorial ;</p>	<b>3</b>	

Question	Answer	Marks	Guidance
3(a)	correct sequence for all ; all correct arrows ;	<b>2</b>	
3(b)(i)	<i>any 3 of:</i> ref. to parasitic relationship ; nematode <u>feeds</u> on tuna ; tuna is harmed ; identify nematode as parasite and tuna as host ;	<b>3</b>	
3(b)(ii)	<i>any 2 of:</i> more tuna have nematodes in stomach compared with abdomen / ORA ; wider range of number of nematodes in abdomen than stomach / ORA ; larger mean number of nematodes found in the abdominal cavity than stomach / ORA ;	<b>2</b>	
3(b)(iii)	less energy / nutrients available for growth (of tuna) ; AVP ;	<b>1</b>	
3(c)	mutualism ;	<b>1</b>	

Question	Answer	Marks	Guidance
4(a)(i)	increase in salinity ; caused by, evaporation / loss, of <u>water</u> ; leaving <u>salt</u> behind / <u>salt</u> does not evaporate ;	3	
4(a)(ii)	<i>any 2 of :</i> precipitation ; runoff of fresh water ; melting of, icebergs / ice caps ;	2	
4(b)(i)	<i>carbon</i> make organic material ;  <i>magnesium</i> make chlorophyll ;	2	
4(b)(ii)	uptake by, plants / algae / producers ;	1	
4(b)(iii)	runoff / upwelling ;	1	



Question	Answer	Marks	Guidance
4(c)	<p><i>any 4 of:</i></p> <p><u>reservoir</u> of nutrients in surface ;</p> <p>uptake by, producers / plants / algae ;</p> <p>idea of, sulfur moving along the food chain ;</p> <p>idea of, released during, death / decay / faeces ;</p> <p>due to, microorganisms / decomposers / bacteria ;</p> <p>sinks to seabed / incorporated into reef ;</p> <p>upwelling brings sulfur to surface reservoir ;</p>	<b>4</b>	

Question	Answer	Marks	Guidance
5(a)	(–) 90 (%) ;; <b>A</b> 86.25–91.25%	<b>2</b>	
5(b)	<p><i>any 3 of:</i></p> <p>as depth increases, oxygen increases, then decreases, then increases again ;</p> <p>oxygen increases from surface to <math>4.4 \text{ cm}^3 \text{ dm}^{-3}</math> at 0.15 km depth ;</p> <p>decreases to <math>0.4 \text{ cm}^3 \text{ dm}^{-3}</math> at 0.95 km ;</p> <p>increases to <math>3.1 \text{ cm}^3 \text{ dm}^{-3}</math> at 4 km ;</p> <p>more gradual increase between 0.95 km to 4 km ;</p> <p>data manipulation ;</p>	<b>3</b>	

Question	Answer	Marks	Guidance
5(c)	<p><i>any 4 of:</i></p> <p>diffusion from the atmosphere at surface ;</p> <p>increased by, water movement / wave action / turbulence at surface ;</p> <p>below thermocline temperature decreases so solubility increasing ;</p> <p>increasing pressure increases solubility ;</p> <p>more light at surface increases oxygen concentration ;</p> <p>due to photosynthesis above 0.1 km ;</p> <p>respiration causes oxygen concentration to decrease ;</p>	<b>4</b>	

Question	Answer	Marks	Guidance
6(a)(i)	<p>convergent plate boundary ;</p> <p>divergent plate boundary ;</p>	<b>2</b>	
6(a)(ii)	between North American plate and Pacific plate ;	<b>1</b>	
6(b)(i)	<p><i>any 4 of:</i></p> <p>plates 'lock' together ;</p> <p>subduction takes place / description of ;</p> <p>pressure builds up ;</p> <p>plates slip ;</p> <p>energy released as earthquake ;</p>	<b>4</b>	

Question	Answer	Marks	Guidance
6(b)(ii)	<p><i>any 2 of :</i> sudden, slippage of plates / release of energy ;</p> <p>displacement of <u>large volume</u> of water ;</p> <p>energy creates, fast moving / long distance / long wavelength, wave ;</p>	<b>2</b>	

Question	Answer	Marks	Guidance
7(a)(i)	role / function, of an organism in an ecosystem ;	<b>1</b>	
7(a)(ii)	<p><i>any 3 of :</i> butterfly fish have a narrow range of food material / AW ;</p> <p>occupy a very, specific / limited habitat ;</p> <p>tuna have a wide range of food ;</p> <p>tuna have wide ranging habitat ;</p>	<b>3</b>	
7(b)	<p><i>any 3 of :</i> occupy different niches ;</p> <p>different food sources so reduced competition ;</p> <p>different depths so reduced competition ;</p> <p>different colouring / patterns, allow camouflage in different reef areas / ensures different species do not interbreed ;</p>	<b>3</b>	
7(c)(i)	<p><i>unstable</i> sand of a reef slope / sandy shore ;</p> <p><i>extreme</i> hydrothermal vent ;</p>	<b>2</b>	

<b>Question</b>	<b>Answer</b>	<b>Marks</b>	<b>Guidance</b>
7(c)(ii)	variety of organisms in an environment / AW ;	<b>1</b>	
7(c)(iii)	<i>any 3 of:</i> not many species are adapted to survive in this habitat ;  example of adaptation for named environmental habitat ;  relatively few niches available ;  low productivity ;  leads to short food chains ;	<b>3</b>	