Cambridge International A Level

Cambridge Assessment International Education
Cambridge International Advanced Level

MARINE SCIENCE **9693/21**

Paper 2 AS Data Handling and Free-Response **May/June 2019**

MARK SCHEME

Maximum Mark: 50

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 May/June 2019 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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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.

<table>
<tr><th>Question</th><th>Answer</th><th>Marks</th><th>Guidance</th></tr>
<tr><td>1(a)</td><td>any 2 of:
age of limpets ;
number of limpets in sample ;
health of limpets ;
impact of predation / death of limpets ;
exact morphology of rock / type of rock / nature of rock surface ;
(degree of) turbulence (when submerged) / wave action / currents ;

length of time exposed / time between tides ;
height of tide ;</td><td>2</td><td></td></tr>
<tr><td>1(b)(i)</td><td>60(.0) ; ;</td><td>2</td><td></td></tr>
<tr><td>1(b)(ii)</td><td>appropriate linear scale for both axes ;
both axes labelled including units ;
all points plotted correctly (± 1 mm) ;

<table><tr><th>distance moved / cm</th><th>percentage returning to home scar</th></tr><tr><td>10</td><td>93.8</td></tr><tr><td>20</td><td>66.7</td></tr><tr><td>30</td><td>78.6</td></tr><tr><td>40</td><td>73.3</td></tr><tr><td>50</td><td>60.0 but ECF from 1(b)(i)</td></tr></table>
all points joined correctly with ruled straight lines(± 1 mm) ;</td><td>4</td><td></td></tr>
</table>

Question	Answer	Marks	Guidance
1(b)(iii)	*any 3 of:* data shows the greater the distance, the lower the percentage of limpets returning / **AW** ; manipulation of figures to support answer ; ref. to (ignoring) anomaly for 20 cm **OR** reference to it not supporting hypothesis ; ref. to, only 5 data points / lack of repeats ;	**3**	
1(c)	*any 2 of:* home scar allows better surface for attachment to rocks (during low tide) ; so less chance of predation ; so less chance of, desiccation / drying out ; home scar in, more sheltered / less exposed area ; so less chance of being washed off / greater resistance to wave action ; **AVP** ; ;	**2**	**A** tight seal can be formed against rock e.g. allows water to be trapped under shell ; which assists gas exchange ;

Question	Answer	Marks	Guidance
2(a)(i)	El Niño ;	**1**	**I** southern oscillation **R** La Nina / La Nino / La Niña / La Niño
2(a)(ii)	catch likely to be reduced ; reduces / stops upwelling **OR** fewer nutrients reaching surface waters ; low productivity / low productivity in (named) producer ;	**3**	**A** reduction in producer population
2(b)(i)	the variation / values / data for each month added together ; then divided by relevant number of values ;	**2**	**R** temperature values added
2(b)(ii)	2009 / 2014 / 2015 ;	**1**	two years required for mark

Question	Answer	Marks	Guidance
3(a)(i)	the role of an organism ; in an ecosystem / habitat ;	**2**	**A** species for organism **I** environment
3(a)(ii)	*any 4 from:* 1 a suitable named marine habitat ; 2 suitable named marine organism e.g. butterfly fish / *Tevnia* / *Riftia* / parrot fish / zooxanthellae ; 3 (occur in habitats / ecosystems with) high biodiversity / many different species ; 4 high degree of competition between organisms ; 5 (idea of narrow) niches, prevent overlap / reduce competition ; 6 ref. to specialist feeders / only eats coral / may only feed on one type of food ;	**4**	
3(b)(i)	*any 5 of: MP2,3,8 could be awarded from correct PS equation* 1 photosynthesis / photosynthetic ; 2 use (energy from) (sun)light ; 3 converts carbon dioxide and water ; 4 chemosynthesis / chemosynthetic ; 5 use chemical energy ; 6 (of dissolved) minerals / hydrogen sulfide / methane ; 7 idea of, products (of either process) storing (chemical) energy ; 8 into glucose ; 9 ref. to (primary) production / (named) producers ;	**5**	**Max of 4 if only discussing photosynthesis / chemosynthesis** **I** sun alone **R** making energy

Question	Answer	Marks	Guidance
3(b)(ii)	*any 4 of:* *(In organisms being eaten:)* some (energy) lost in respiration / as heat ; ref. to use of energy ; (energy) lost in urine / excretion ; *(in transfer to consumer:)* not all organisms are eaten ; consumer does not eat all parts when feeding ; (energy from undigested / unabsorbed material) lost in faeces / egestion ; (energy) is passed through waste / death, to decomposer / **AW** ;	**4**	**A** any named process that uses energy

Question	Answer	Marks	Guidance
4(a)	*any 4 of:* movement of convergent / transform (plate) boundaries ; build-up of pressure / tension ; sudden release / sudden slippage; (of) large amounts of energy ; (from) earthquake below seabed / underwater earthquake ; (causing) vertical displacement of seabed ; large displacement of (sea)water ;	**4**	

Question	Answer	Marks	Guidance
4(b)	*any 5 of:* 1 oceanic volcano emerges / volcanic island ; 2 colonised / settling, by, reef-building / hermatypic, coral **OR** colonised / settling, by coral polyps / coral larvae ; 3 so, fringing reef develops ; 4 volcano becomes dormant / extinct ; 5 volcano / island, begins to sink / subside ; 6 so, barrier reef develops ; 7 lagoon / description of, forms between reef and island ; 8 volcano / island, eventually sinks below sea level / disappears ;	**5**	Accept marking points from well labelled / annotated diagrams. **I** coral unqualified **R** if answer implies barrier formed before fringing
4(c)	*any 6 of:* 1 shape / morphology / configuration / geomorphology, of coastline ; 2 funnelling / channelling, of water into small area increases range ; 3 slope / relief of shore ; 4 lower range on shallower relief ; 5 size / volume, of water body ; 6 larger body has greater range; 7 air / atmospheric pressure ; 8 lower pressure causes greater range / higher tide ; 9 speed / strength of wind; 10 greater wind speed increases range / higher tide ; 11 wind direction (onshore / offshore) ; 12 correct description e.g. onshore causing higher tide ;	**6**	