MARINE SCIENCE **9693/21**

Paper 2 AS Data Handling and Free Response **May/June 2018**

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.

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This document consists of **9** printed pages.

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)	1961 ;	1	
1(b)	*Any 3 of:* (overall) decrease ; (approx.) steady rate since 2007 ; ref. to (small) fluctuations / description of these ; idea of, great(est) rate of decline 1983–1989 ; manipulation of data ;	3	must be meaningful calculation(s) to illustrate a point – not just lifting data from graph
1(c)	between 78.1–80.3 ; idea of decrease ;	2	
1(d)	(population) increase **+** as catch / predation has decreased ; **OR** (population) decrease **+** due to idea of, overfishing ; **OR** (population) stays the same **+** as catch has stabilised ;	1	

Question	Answer	Marks	Guidance
2(a)(i)	*Any 4 of:* count total number of, each / different, <u>species</u> ; at each depth / 2 m, 4 m and 12 m / idea of, different depths ; idea of, sample every 2 m / smaller intervals of depth ; how to count / estimate (quadrat / belt or line transect) ; control variable ; repeat / find, mean / average ; do not damage coral ;	4	**A** 'types' to mean species **A** 'at these depths' **A** idea of a grid, take photos (to analyse later) e.g. (suitable) size of area sample / ref. to suitable time period / same reef ;
2(a)(ii)	both **axes** correctly labelled ; linear **scale** on y axis ; data for 4 m **plotted** ± ½ square ; **bars** not touching **+** of equal width ;	4	 plots must take up at least half the grid max 3 for other type of graph – MP4 not available
2(a)(iii)	species **E** + **F** show even distribution with depth / survive at any depth tested ; species **A** + **B** prefer 2 m / shallow water / hig<u>her</u> / hig<u>hest</u> at 2 m; species **C** + **D** prefer 12 m / deeper water / hig<u>her</u> / hig<u>hest</u> at 12 m ;	3	 **R** other stated depths / lower/ lowest at 2 m **R** other stated depths / lower / lowest at 12 m

Question	Answer	Marks	Guidance
2(b)	species **A**–**D** do support (the hypothesis), as narrow range / optimum depth with high numbers **AW** ; species **E** and **F** do not support (the hypothesis), as similar numbers at all depths / **E** and **F** can live in both deep and shallow water ; if no other marks awarded, all for 1 mark '**A** to **D** do support **AND E** and **F** do not'	**2**	**A** in terms of just one species **A** in terms of just one species
3(a)	<u>both</u> are types of a symbiotic relationship ; *(mutualism)* both species benefit ; *(parasitism)* 1 species benefits at expense of other ; use term <u>host</u> appropriately ; *mutualism* named pair of species ; *Only credit examples if they are mutualism – if in doubt, look it up. For example, whale and barnacle is NOT mutualism.* benefit to species 1 ; benefit to species 2 ; *parasitism* example of host and parasite ; description of the benefit to parasite ; description of the harm to host ;	**8**	

Question	Answer	Marks	Guidance
3(b)(i)	<u>rate</u> ; at which, organic material / biomass is produced / increases ;	**2**	 **R** idea of energy production
3(b)(ii)	*Any 5 of:* 1 clear water / low turbidity ; 2 for, high <u>light</u> penetration ; 3 shallow water / being near surface ; 4 idea of, suitable temperature ; 5 for, enzymes ; 6 large amounts of sunlight / a lot of energy / high light intensity ; 7 idea of, <u>fast rate</u> of photosynthesis ; 8 by zooxanthellae / producer ; 9 it is, a stable / not extreme, environment ; 10 idea of, rapid / high, nutrient cycling / **AW** ;	**5**	 **I** warm unqualified **I** photosynthesise easily

Question	Answer	Marks	Guidance
4(a)(i)	*Any 6 of:* 1 ref. to tides due to <u>gravitational,</u> effects / pull / forces, of Sun and Moon ; 2 neap tides have a small(er) <u>range</u> ; 3 spring tides have a large(r) <u>range</u> ; *(neap tides)* 4 when the Sun, (Earth) and Moon form a right angle / perpendicular ; 5 reduced <u>gravitational</u> effect ; *(spring tides)* 6 when the Sun, (Earth) and Moon are in a straight line / aligned ; 7 combined / greater, <u>gravitational</u> effect ;	6	tides alone is insufficient for MP2 and 3-idea of tidal range is needed
4(a)(ii)	wind <u>direction</u> ; wind <u>speed / strength</u> ; air pressure ; size / depth / area / volume, of water body ; idea of, geomorphology ;	3	**A** offshore / on shore wind for wind direction **I** wind unqualified for MP1 and 2 e.g. shape of, coast / shore / seabed, slope of coast

Question		Answer	Marks	Guidance
4(b)	1	idea of, organism adapted to survive where they live / environment ;	**6**	
	2	nutrient availability ;		
	3	ref. to gas concentration / gas availability ;		
	4	salinity varies ;		
	5	idea of, large temperature range ;		
	6	idea of, desiccation / exposure to air **OR** freezing ;		
	7	wave action ;		
	8	topography / slope / shape ;		
	9	exposed / sheltered, (coastline) ;		**A** aspect
	10	tidal range ;		
	11	type of substrate / resistance to, erosion / weathering ;		