CAMBRIDGE INTERNATIONAL EXAMINATIONS

Cambridge International Advanced Subsidiary and Advanced Level

MARK SCHEME for the May/June 2015 series

9693 MARINE SCIENCE

9693/01 Paper 1 (AS Structured Questions), maximum raw mark 75

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 will not enter into discussions about these mark schemes.

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Mark schemes will use these abbreviations:

;	separates marking points
/	alternatives
()	contents of brackets are not required but should be implied
R	reject
A	accept (for answers correctly cued by the question, or guidance for examiners)
Ig	ignore (for incorrect but irrelevant responses)
AW	alternative wording (where responses vary more than usual)
AVP	alternative valid point (where a greater than usual variety of responses is expected)
ORA	or reverse argument
underline	actual word underlined must be used by candidate (grammatical variants excepted)
max	indicates the maximum number of marks that can be given
+	statements on both sides of the + are needed for that mark

Question	Expected answers	Additional guidance	Marks
1 (a) (i)	A – arrows on each side to centre ; B – arrows on each side away from centre ; C – arrows along centre in opposing directions ;		[3]
(ii)	(mid ocean ridges) – divergent / description ; (ocean trenches) – convergent / description ; (volcanoes) – divergent / convergent / description ;	**A** constructive / plates pushed apart **A** destructive / subduction / plates come together	[3]
(b)	1. (cold sea) water seeps / moves into cracks (in sea bed) / **AW** ; 2. water heated by magma (under the ocean floor) ; 3. (named) mineral <u>dissolve</u> in water / water contains mineral / metal / named, e.g. <u>ions</u> ; 4. hot water is forced up (to the ocean floor) ; 5. water cools ; 6. minerals precipitate out ;	 **A** under pressure **A** deposit out / come out of solution	[max 5]
			[Total 11]

Question	Expected answers	Additional guidance	Marks
2 (a) (i)	1. high nutrient concentration ; 2. increasing sunlight ; 3. increased photosynthesis / (primary) productivity ; 4. increasing temperature ;		[max 3]
(ii)	used up (by phytoplankton) ;		[1]
(iii)	(maximum) lower than phytoplankton ; rises and falls (as per phytoplankton) ; but with time lag relative to phytoplankton ;	 peak after phytoplankton peak	[3]
(b) (i)	92 000 (a.u) ;		[1]
(ii)	9170 (a.u.) ;		[1]
(iii)	figure within range of 900 to 950 (a.u.)	**A** allow e.c.f. as long as approx. 10% of answer to (ii)	[1]
(iv)	heat / kinetic / thermal ;		[1]
(c)	*similarities* 1. both make organic material / glucose ; 2. from inorganic substances / named, e.g. CO_2 ; 3. make energy / food / named organic material **+** available to / is basis of food chain ; *differences* 1. chemical energy v light (energy) ; 2. ref. to use of H_2S for chemosynthesis ; 3. chemosynthesis only in bacteria ; 4. AVP ;	 **A** carried out by producers **A** solar **A** sulfides or sulfites **A** photosynthesis in plants, bacteria, and algae e.g. photosynthesis requires chlorophyll	[max 4]
			[Total 15]

Question	Expected answers	Additional guidance	Marks
3 (a) (i)	seagrass **+** marine algae **+** phytoplankton;		[1]
(ii)	both full names added ; two arrows in correct direction ;		[2]
(iii)	decrease in population of turtles ; more competition for sea grass / less food for sea turtles (as population of jellyfish declines) ;		[2]
(iv)	1. *idea of* many types of prey / food source ; 2. *idea of* free-roaming / move between habitats / environments 3. *idea that* sharks can live in wide range of conditions ;	e. g. “can hunt in different areas” e.g. can survive at different temperatures, pressures / depths, etc.	[3]
(b)	1. *idea of* lack of sunlight / reduced light penetration ; 2. for photosynthesis ; 3. ref. zooxanthellae ; 4. ref. symbiosis / mutualism ; 5. *idea* of temperature too low ;		[max 3]
			[Total 11]
4 (a)	fish – bones / skeletons / teeth ; corals – (coral) skeleton / corallite / ref. calcium carbonate ;		[2]
(b) (i)	D – harvesting / fishing / feeding / eating / consuming ; F – upwelling ; G – ref. to (part of) food chains ;	**A** uptake / intake / consuming / feeding	[3]

Question	Expected answers	Additional guidance	Marks
(ii)	1. present in rocks / soils / fertilisers ; 2. dissolve in (fresh) water ; 3. (carried to sea) in rivers / streams / runoff ;	**A** ref. to leaching	[3]
(iii)	1. death of organisms / excretion / egestion ; 2. sinks / **AW** (to sea bed) ; 3. decomposition / decay / ref. decomposers ; 4. ref. action of bacteria ;		[max 3]
			[Total 11]
5 (a)	1. ref. to erosion / abrasion by sediments / sand ; 2. ref. to hurricanes / storms / tsunamis / wave action ; 3. coral-eating organisms / e.g. ; 4. ref. to acid water ; 5. ref. to human activities, e.g. coral mining, damage by boats / anchors / tourists qual. ;	**A** predation **A** ref. high levels of CO_2	[max 3]

Question	Expected answers	Additional guidance	Marks
(b) (i)	any 2 pairs of: heavy / sturdy / large ; won't be washed away / **AW** ; provide (suitable) surface qual. ; for attachment for algae / coral / barnacles / etc. ; holes / voids / hollow ; hiding places / shelter / protection for fish / organisms / other named example ; ref. material that will not / corrode / break down / erosion ; permanent reef / long-lasting ;	max. 2 for properties, max. 2 for qualifications **A** ref. to resistant to weathering	[max 4]
(ii)	reduce wave energy ; dissipate wave action / slows down waves ; prevent shoreline being washed away / erosion ;	**A** breakwater	[max 2]
(iii)	1. expensive / cost (to produce) ; 2. difficult to install ; 3. navigation hazard ; 4. ref. impact to tourists / unattractive ;		[max 2]
(c) (i)	20 m ;		[1]

Question	Expected answers	Additional guidance	Marks
(ii)	1. sea bed / beach at increased elevation ; 2. beach shallower / flatter (for first 20 metres) / steeper (after 20 m) or more beach ; 3. change / difference greater for beach than sea bed ; 4. use of correct comparative figures, e.g. greatest change in elevation is approx. 1.4 m ;	**A** (profile is) higher	[max 3]
			[Total 15]
6 (a)	1. sea (surface) min. temperature 26 °C ; 2. ref. evaporation ; 3. warm moist air / water vapour rises; 4. ref. condensation / heavy rain / precipitation ; 5. releases heat / energy / correct ref. latent heat ; 6. low wind shear ; 7. (thunder)storms develop / formed / merge ; 8. system / cyclone rotates / spiral winds ; 9. ref. Coriolis effect / earth rotation ;	**A** 79 °F	[max 5]
(b)	eye ; (eye) wall ; spiral pattern of clouds ;	**I** description of eye **A** circular pattern of clouds	[max 2]
(c) (i)	as air pressure increases wind speed falls / ora ;	**A** inverse relationship	[1]
(ii)	28 ;		[1]

Question	Expected answers	Additional guidance	Marks
(d)	1. ref. to water / nutrients / named example ; 2. to crops / ref. to agriculture benefitting ; 3. improved productivity of (inshore) sea ; 4. prevent desertification / revives arid land / prevents droughts ;		[3]
			[Total 12]