

## **MARK SCHEME for the October/November 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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<b>Question</b>	<b>Expected answers</b>	<b>Additional guidance</b>	<b>Marks</b>
<b>1 (a) (i)</b>	relationship between two <u>species</u> ; parasite benefits, host is harmed ;		<b>[2]</b>
<b>(ii)</b>	any 2 of: tuna and nematode ;  tuna is host, nematode is parasite ;  (nematodes) lives in tissues /gut of tuna ;  tuna harmed, nematode benefits by gaining nutrients ;	<b>A</b> other marine example	<b>[2]</b>
<b>(b) (i)</b>	relationship between two <u>species</u> ; both organisms benefit ;		<b>[2]</b>
<b>(ii)</b>	any 2 of: grouper and cleaner fish ; cleaner fish feeds on dead tissue /bacteria /parasites, grouper has parasites removed ;  chemosynthetic bacteria and tube worms ; tubeworms provide shelter, bacteria provide food ;  coral and zooxanthellae ; corals get food from zooxanthellae, corals provide shelter for zooxanthellae ;	<b>A</b> other marine examples	<b>[2]</b>
			<b>[Total: 8]</b>

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<b>Question</b>	<b>Expected answers</b>	<b>Additional guidance</b>	<b>Marks</b>
<b>2 (a) (i)</b>	4.24 – 4.26 ; mm per year ;		<b>[2]</b>
<b>(ii)</b>	as depth increases, growth rate decreases ; relationship is linear ; any 1 correct reference to figures ;		<b>[3]</b>
<b>(iii)</b>	faster growth near surface ; <b>+</b> <b>EITHER</b> more light near surface ; corals contain zooxanthellae which need light ; for photosynthesis ; <b>OR</b> higher temperature near surface ; increased enzyme activity ; for photosynthesis ; <b>OR</b> mixing of air and water at surface ; more carbon dioxide available ; for photosynthesis ;	<b>A reverse argument</b>	<b>[4]</b>

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<b>Question</b>	<b>Expected answers</b>	<b>Additional guidance</b>	<b>Marks</b>
<b>(b) (i)</b>	A – coral / reef ; B – (open) sea / ocean ; C – lagoon ;		<b>[3]</b>
<b>(ii)</b>	any 4 of: ref. volcano ; island forms ; growth of coral ; fringing reef develops around island ; land / volcano starts to sink ; barrier reef formed ; island sinks below sea level / water surface ;		<b>[4]</b>
<b>[Total: 16]</b>			
<b>3 (a) (i)</b>	<pre> graph LR     A[phytoplankton] --&gt; B[zooplankton]     B --&gt; C[mussels]     C --&gt; D[whelks / crabs]     D --&gt; E[lobsters / gulls]     E --&gt; F[ ; ]           </pre>		<b>[1]</b>
<b>(ii)</b>	(effect) decrease in mussel population ; + any 3 of: more crabs / more whelks to eat mussels ; (because) less crabs / less whelks eaten by lobsters ; less limpets eaten by lobsters ; (more limpets) for crabs to eat ; (therefore) more crabs, more mussels eaten ;  (effect) increase in mussel population ; + less lobsters to eat mussels ;	<b>A</b> other valid interpretations cause must be linked to effect	<b>[4]</b>

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<b>Question</b>	<b>Expected answers</b>	<b>Additional guidance</b>	<b>Marks</b>
<b>(b) (i)</b>	any 3 of: <u>photosynthesis</u> ; captures/traps/uses (sun) <u>light energy</u> ; ref. chlorophyll ; ref. carbon dioxide and water ; carbohydrate/e.g. and oxygen ; energy/food made available to rest of food chain ;	I chloroplast	<b>[3]</b>
<b>(ii)</b>	1890 arbitrary units ;; if answer incorrect allow 1 mark for correct working 3368 – (1095 + 383)		<b>[2]</b>
<b>(iii)</b>	0.091 (%) ;; <b>A</b> 0.09 if answer incorrect allow 1 mark for correct working (19/20 810 × 100)		<b>[2]</b>
<b>(iv)</b>	any 3 of: some parts not eaten/indigestible ;  lost in faeces/waste/excretion ;  energy loss in movement ;  heat loss in respiration ;		<b>[3]</b>
<b>(v)</b>	any 2 of: ref. decay/breakdown of dead animals/plants/organic matter ;  release of nutrients/ions/minerals/salts ;  taken up by producers/phytoplankton ;  increased growth ;	<b>A</b> reference to upwelling	<b>[2]</b>
			<b>[Total: 17]</b>

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<b>Question</b>	<b>Expected answers</b>	<b>Additional guidance</b>	<b>Marks</b>
<b>4 (a)</b>	total amount of salts dissolved in (sea) water ;	I any units given	<b>[1]</b>
<b>(b) (i)</b>	(magnesium) to make chlorophyll ; (calcium) bones / skeletons ; (nitrate) protein / amino acids ;	A named example	<b>[3]</b>
<b>(ii)</b>	any 2 of: river / streams ; runoff ; underwater volcanoes ; hydrothermal vents ; atmospheric dissolution ;	I rainfall	<b>[2]</b>
<b>(iii)</b>	any 2 of: ref. food chains / harvesting ;  'locked' into sediments on sea bed / coral ;  removed by sea spray ;		<b>[2]</b>
<b>(c) (i)</b>	hotter in summer therefore increased evaporation ; causing increased concentration of salts ; <b>OR</b> increased rainfall in winter causing reduced concentration of salts ;		<b>[2]</b>
<b>(ii)</b>	melting of glaciers / icebergs ;  adds large volumes of fresh water, reducing concentration of salts ;		<b>[2]</b>
			<b>[Total 12]</b>

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<b>5 (a) (i)</b>	body of water ; where river meets sea / seawater meets freshwater ;		<b>[2]</b>
<b>(ii)</b>	any 2 of: tidal flow / currents ; brackish water / changes in salinity ; flooding / changes in water level ; high levels of sediment ;		<b>[2]</b>
<b>(b) (i)</b>	A – delta ; B – rocky shore ; C – sandy shore ;		<b>[3]</b>
<b>(ii)</b>	any 4 of: ref. erosion ; very fine particles / clay / silt ; from river / sea ; water slow moving / little wave action ; sedimentation ; accumulation ;		<b>[4]</b>

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<b>Question</b>	<b>Expected answers</b>	<b>Additional guidance</b>	<b>Marks</b>
<b>(iii)</b>	any 2 of: extensive root system for anchorage ;  prop/aerial roots for support/trap sediment ;  pneumatophores/pores to take in/oxygen/air ;  ref. to salt exclusion/excretion/ (increased) salt tolerance ;	R long	<b>[2]</b>
			<b>[Total: 13]</b>



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<b>Question</b>	<b>Expected answers</b>	<b>Additional guidance</b>	<b>Marks</b>															
<b>6 (a) (i)</b>	any 2 of: relatively flat areas of the ocean floor / sea bed ; 3000 and 6000 m below sea level ; situated between ocean trenches and continental rises ;		<b>[2]</b>															
<b>(ii)</b>	any 3 of: upwards movement of molten material / lava / magma ; which solidifies and forms new ocean crust ; ref. mantle convection ; uneven rock surface becomes covered by sediments from above ;		<b>[3]</b>															
<b>(b)</b>	<table border="1"> <thead> <tr> <th>tectonic process</th> <th>description of feature</th> <th>name of feature formed</th> </tr> </thead> <tbody> <tr> <td>upward movement and spreading of the underlying magma at a divergent plate boundary.</td> <td>underwater mountain range</td> <td>mid – ocean ridge ;</td> </tr> <tr> <td>diverging or converging plate boundaries.</td> <td>fissure through which hot gases and molten rock can escape</td> <td>volcano ;</td> </tr> <tr> <td>where one plate is forced under another plate</td> <td>very long, narrow structures on the ocean floor</td> <td>ocean trench ;</td> </tr> <tr> <td>abrupt slippage of one plate against another at a convergent plate boundary</td> <td>sudden movement of a very large volume of water</td> <td>tsunami ;</td> </tr> </tbody> </table>	tectonic process	description of feature	name of feature formed	upward movement and spreading of the underlying magma at a divergent plate boundary.	underwater mountain range	mid – ocean ridge ;	diverging or converging plate boundaries.	fissure through which hot gases and molten rock can escape	volcano ;	where one plate is forced under another plate	very long, narrow structures on the ocean floor	ocean trench ;	abrupt slippage of one plate against another at a convergent plate boundary	sudden movement of a very large volume of water	tsunami ;		<b>[4]</b>
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