

**CAMBRIDGE INTERNATIONAL EXAMINATIONS**

**GCE Advanced Subsidiary Level and GCE Advanced Level**

## **MARK SCHEME for the May/June 2014 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.

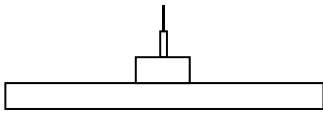
Cambridge will not enter into discussions about these mark schemes.

Cambridge is publishing the mark schemes for the May/June 2014 series for most IGCSE, GCE Advanced Level and Advanced Subsidiary Level components and some Ordinary Level components.

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<b>Question</b>	<b>Expected answers</b>	<b>Additional guidance</b>	<b>Marks</b>
<b>1 (a) (i)</b>	most found between 30° N and 30° S /between tropics / close to / around the equator ;		1
<b>(ii)</b>	(corals) need warm water / suitable temperature / range 16 to 35°C for growth / survival ;		1
<b>(b) (i)</b>	allow passage of / corals need light / owtte / ora ; for photosynthesis + zooxanthellae / algae ;		2
<b>(ii)</b>	for attachment / owtte ;		1
<b>(c) (i)</b>	fell / decreased + 22 to 9 / by 13% ;		1
<b>(ii)</b>	any 3 of:  (corals killed by) predation / crown of thorns starfish / parrot fish ;  (corals killed by) disease / pathogens / named ;  climate change / global warming / sea temperature outside growth range / for survival / coral bleaching / coral drying out / owtte ;  physical destruction of reef + storms / hurricanes / cyclones / damage by silt abrasion / erosion / ref. to damaging human effect, e.g. walking on coral ;  coral mining / dynamite fishing / coral trading ;  (coral killed by) pollution + ref. named pollutant, e.g. poisons / oil / pesticides / carbon dioxide / excess fertilisers ;  (light blocked by) sediments / algal blooms ;		3
<b>Total</b>			<b>9</b>
<b>2 (a) (i)</b>	(feeding) level / position in food chain / web ;  e.g. krill at second level ;	<b>R</b> energy level	2
<b>(ii)</b>	(direction of) transfer of energy ;  (direction of) transfer of biomass from one organism to another / owtte ;	<b>I</b> what eats what	2

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	<b>(iii)</b>	feed on each other ; reference to respective part of life cycle / age / size / species ;		2
	<b>(iv)</b>	correct shape ; organisms fully named ; proportions as shown in additional guidance (each bar to be same height) ;		3
	<b>(b) (i)</b>	any 3 of: movement of water from deep / bottom of ocean / sea / sea bed / floor ; (water) carries nutrients ; to surface ; reference to mechanism, e.g. wind, ocean currents / ref. to topography of sea bed / example / descriptions ;		3
	<b>(ii)</b>	any 3 of: increased / more nutrients / minerals + phytoplankton / producers ; named nutrient / mineral ; ref. photosynthesis ; increase in productivity of producers ; increase in population / numbers of other organisms / named / consumers / ref. food chain / web ;	<b>R food</b>	3
<b>Total</b>				<b>15</b>
<b>3</b>	<b>(a) (i)</b>	relationship between two / different species ; (where) both benefit / description / idea of mutualism ; e.g. coral and zooxanthellae / cleaner fish and grouper / chemosynthetic bacteria and tubeworms ;		3

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<b>(ii)</b>	relationship between two / different species ;  (where) one is harmed and other benefits / description / owtte ;  e.g. fish lice and host, nematodes / roundworms and fish ;		<b>3</b>
<b>(b)</b>	any 3 of:  chemosynthetic ;  bacteria ;  in the tissues ;  use minerals / named ;  to produce organic material / named ;	<b>R</b> food	<b>3</b>
<b>Total</b>			<b>9</b>
<b>4 (a)</b>	any 4 of:  warm water / 26.5°C + ;  low pressure area ;  evaporation (of water) / water vapour rises ;  water condenses ;  releases heat / energy ;  system / cyclone rotates / owtte ;  reference to Earth's rotation / Coriolis effect ;	<b>I</b> high temperature        <b>I</b> winds and clouds	<b>4</b>
<b>(b) (i)</b>	64 / 65 millibars / mb ;		<b>1</b>
<b>(ii)</b>	axis scaled and labelled ;  line (labelled / key) ;  plots $\pm \frac{1}{2}$ square ;  smooth or straight line ;	<b>I</b> if left axis used      <b>-1</b> for any incorrect  <b>R</b> thick / wavy / double line line must go through plots	<b>4</b>

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<b>(iii)</b>	wind speed increases then decreases as distance from centre increases / ora ;  ref. 40 km (from centre) ;  (due to low) pressure in eye increasing with distance from centre / pressure gradient increases with distance from centre ;		<b>3</b>
<b>Total</b>			<b>12</b>
<b>5 (a) (i)</b>	thermocline ;		<b>1</b>
<b>(ii)</b>	line falling to left throughout ;  below 10 and not touching existing line at any point ;		<b>2</b>
<b>(b) (i)</b>	D at bottom of column / touching x-axis ;  density greatest when water coldest ;		<b>2</b>
<b>(ii)</b>	any 2 of:  rainfall / precipitation ;  less evaporation ;  fresh water inflow / melting ice / owtte ;		<b>2</b>
<b>(c)</b>	any 3 of:  less oxygen with high temperature / ora ;  solubility of oxygen decreases with increasing temperature ;  increases due to mixing by waves / winds / turbulence ;  increases / produced by photosynthesis (of phytoplankton / algae) ;  decreases due to respiration ;		<b>3</b>
<b>Total</b>			<b>10</b>

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6 (a)	<p>any 4 of:</p> <p>(rocky) stable v (sandy) unstable ;</p> <p>not easily eroded v eroded / rocks provide breakwater / resist wave action ;</p> <p>(rocky) attachment for algae / seaweeds / other marine organisms / ora ;</p> <p>(rocky) more habitats / ora ;</p> <p>(rocky) provide shelter / protection / ora ;</p> <p>example of rocky habitat given, e.g. rock pool ;</p> <p>(sandy) organisms washed away ;</p> <p>(sandy) only suitable for burrowing organisms / ora ;</p>		4
(b) (i)	<p>extensive / large root system / many roots / owtte ;</p> <p>+ any 2 of:</p> <p>traps / holds particles / sediments / mud / soil / sand / more sedimentation / owtte / ora ;</p> <p>reduces water flow / movement ;</p> <p>protects from wave energy / wave break / owtte ;</p>		3
(ii)	<p>any 3 of:</p> <p>aquaculture, e.g. shrimp farming ;</p> <p>land reclamation, e.g. for resort building / construction / buildings / coastal development / infrastructure / agriculture ;</p> <p>removal / cutting down for timber / deforestation ;</p> <p>pollution + e.g. ;</p> <p>disease / parasites ;</p> <p>adverse weather / storms / hurricanes, etc. ;</p>		3
<b>Total</b>			<b>10</b>

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7 (a) (i)	<p>as carbon dioxide (concentration) in atmosphere increases, carbon dioxide (concentration) in sea water increases / both increase / ora ;</p> <p>any 2 of:  carbon dioxide in air dissolves in sea water / forms a solution / dissolution / diffuses into ;</p> <p>carbon dioxide not very soluble in sea water ;</p> <p>carbon dioxide from sea water enters air + carbon dioxide from air enters sea ;</p> <p>reference to equilibrium ;</p>		3
(ii)	<p>as (concentration of) carbon dioxide in sea water increases, pH falls / ora ;</p> <p>+ any 2 of:  more carbon dioxide dissolves in sea water / forms a solution / dissolution / diffuses into ;</p> <p>forms carbonic acid / bicarbonate ions ;</p> <p>ref. low pH is (more) acidic ;</p>	<b>A reacts</b>	3
(b)	<p>any 4 of:  ref. to erosion / rain / precipitation / fresh water / leaching / runoff ;</p> <p>drained into ocean / sea ;</p> <p>enters food chain / description, e.g. taken up / used by algae / phytoplankton / organisms ;</p> <p>used by corals to form skeleton ;</p> <p>ref. forms bones / shells ;</p> <p>reference to calcium carbonate ;</p> <p>reference to death / decay of organisms ;</p> <p>dead organisms / waste products / detritus / faeces sinks / moves to sea bed ;</p>		4
<b>Total</b>			<b>10</b>