

CAMBRIDGE INTERNATIONAL EXAMINATIONS

Cambridge International Advanced Subsidiary Level

MARK SCHEME for the October/November 2014 series

9693 MARINE SCIENCE

9693/02

Paper 2 (AS Data-Handling and Free-Response),
maximum raw mark 50

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Page 2	Mark Scheme	Syllabus	Paper
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Question	Expected answers	Additional guidance	Marks
1 (a)	rough periwinkles are more abundant than edible periwinkles/ converse ; credit reference to total numbers (15 edible, 39 rough) ; rough more widely distributed than edible ; edible found lower on the shore than rough/ converse ; neither species found at {8/ 14/ 30} metres from low water mark ;		[4]
(b)	THREE of: temperature ; humidity ; exposure time / sunlight / tides ; slope ; wave action ;		[3]
(c)	reference to no repeats / small sample size / small sample area ; samples taken at 2 metre intervals ; (therefore) results may not be representative / owtte ;		[2]
(d)	reference to random sampling ; reference to repeats / large number of samples ; count number of periwinkles in each quadrat / count numbers in each unit area ; reference to running means ; find total number and divide by the total area of quadrats ;		[3]
			[Total: 12]

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Question	Expected answers	Additional guidance	Marks
2 (a)	reference to sea lice causing harm to salmon / reduce swimming endurance / owtte ; sea lice obtain nutrients / energy from salmon ;		[2]
(b)	TWO of: salinity / salt concentration ; (concentration of dissolved) oxygen ; pH ;		[2]
(c)	idea of removing a variable ;		[1]
(d)	results support hypothesis ; results show that swimming endurance decreases as the number of lice increases ; reference to results similar for 1, 2 and 3 lice ; result for 2 lice could be an anomaly ;		[3]
			[Total: 8]

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Question	Expected answers	Additional guidance	Marks
3 (a)	<p>increase in temperature decreases density / converse ;</p> <p>(therefore) warm water floats on top of cold ;</p> <p>temperature decreases as depth increases ;</p> <p>reference to thermocline in correct context ;</p> <p>as salinity decreases, density decreases / converse ;</p> <p>(therefore) less saline water floats on top of more saline ;</p> <p>salinity increases as depth increases ;</p> <p>reference to halocline in correct context ;</p>		[6]
(b) (i)	<p>concentration of dissolved oxygen will increase ;</p> <p>reference to mixing of water with air ;</p>		[2]
(ii)	<p>concentration of dissolved oxygen will decrease ;</p> <p>reference to decreased solubility of oxygen as temperature increases ;</p>		[2]
(c)	<p>idea that air over land heats up ;</p> <p>air (becomes less dense and) rises ;</p> <p>this draws in cooler air from the Indian Ocean ;</p> <p>from SW direction ;</p> <p>air from the Indian Ocean is saturated with water vapour ;</p> <p>this air rises and cools further ;</p> <p>water vapour condenses and falls as rain ;</p>		[5]
			[Total: 15]

Page 5	Mark Scheme	Syllabus	Paper
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Question	Expected answers	Additional guidance	Marks
4 (a)	<p>suitable temperature ;</p> <p>clear water/ no silt ;</p> <p>reference to light (penetration) ;</p> <p>suitable depth ;</p> <p>substrate for attachment ;</p> <p>suitable salinity ;</p> <p>suitable pH/dissolved CO₂ ;</p>	range 16 to 35 °C	[4]
(b)	<p>reference to taking samples from different depths (of reef) ;</p> <p>by drilling ;</p> <p>reference to bands of growth ;</p> <p>reference to carbon-14 in context ;</p> <p>fixed during lifetime of coral ;</p> <p>reference to decay of carbon-14 ;</p> <p>measurements indicate age ;</p> <p>can compare ages at different depths ;</p> <p>reference to timescale ;</p> <p>reference to finding growth rate ;</p>		[8]
(c)	<p>THREE of:</p> <p>dissipate wave energy / owtte ;</p> <p>reduce coastal erosion ;</p> <p>create areas for (safer) anchorage ;</p> <p>provide habitat for marine organisms / increase biodiversity ;</p> <p>reference to benefit to (commercial) fishing ;</p> <p>reference to recreational diving ;</p> <p>reference to economic benefits / attract tourists / ecotourism ;</p>		[3]
			[Total: 15]