

## **MARK SCHEME for the May/June 2013 series**

### **9693 MARINE SCIENCE**

**9693/04**

Paper 4 (A2 Data Handling / Free Response),  
maximum raw mark 50

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 2013 series for most IGCSE, GCE Advanced Level and Advanced Subsidiary Level components and some Ordinary Level components.

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Question	Answers to be awarded credit	Additional Guidance	Mark
1 (a)	S – Scales and axes labelled (mass / g time); L – Both lines drawn neatly (joining the points) and key for each line; P – Points plotted correctly;		3
(b) (i)	GM salmon show faster growth overall / eq; Final mass is higher (for GM salmon); Use of manipulated figures (not simply quoting numbers); Up to 250 days no / little difference; Over 250 days the difference is <u>significant</u> ; Correct reference to overlapping ranges of standard deviations;		3 max
(ii)	Transfer of growth <u>gene</u> ; Into egg / early embryo; Ref to (gene) promoter; Growth gene switched on permanently; Ref to continuous feeding;		2 max
(c)	Variable: 2 tank sizes; Repeat <u>and</u> calculate means; Measurement: <u>change in</u> weight / length / (accept measure before and after a stated time); Controls: food quantity / same temperature / oxygen / starting size / age of fish / number of fish in tanks/ eq;;		4 max
			<b>[Total: 12]</b>

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<b>2 (a)</b>	<p>Biodiversity = the number of individuals of different species / eq;</p> <p>Biodiversity decreases (at desalination plant); Fewer species;</p> <p>Fewer total number of individuals;</p> <p>Red sea crab increases;</p> <p>Manipulated numerical comparison (e.g. 32 more red sea crabs);</p> <p>Credit another specific species example;</p>	<p>MP 1 – biodiversity definition</p> <p>Accept most species have fewer numbers / all but red sea crab are lower/ ignore all species have less.</p> <p>No mark for simply quoting data</p>	4 max
<b>(b)</b>	<p>(Desalination plant) causes high salt concentration / salinity;</p> <p>Releases toxins;</p> <p>Loss of water (from organisms);</p> <p>Correct ref to osmosis;</p> <p>Some organisms are able to osmoregulate / ref to Na<sup>+</sup> pumping / eq;</p> <p>Less competition (so red crab increases in number) / niches become available / eq;</p>		4 max
<b>[Total: 8]</b>			

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<b>3 (a)</b>	<p>Ref to photosynthesis / chemosynthesis;</p> <p>Fixing carbon / energy / producing organic molecules / eq;</p> <p>For primary consumers/ herbivores / food chain / eq;</p> <p>Shelter / habitat;</p> <p>Oxygen release;</p>		4 max
<b>(b)</b>	<ol style="list-style-type: none"> <li>1 Light intensity;</li> <li>2 Energy source;</li> <li>3 light wavelength / colour;</li> <li>4 depth;</li> <li>5 clarity of water / turbidity / sediment;</li> <li>6 ref to blue and red regions absorbed by chlorophyll / eq;</li> <li>7 CO<sub>2</sub>;</li> <li>8 (raw material) for glucose production;</li> <li>9 temperature;</li> <li>10 enzymes;</li> <li>11 magnesium;</li> <li>12 (for) chlorophyll;</li> <li>13 phosphates;</li> <li>14 for ATP;</li> <li>15 salinity;</li> <li>16 osmotic balance;</li> </ol>		Max 7

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<b>(c)</b>	<p>(Hg) is toxic;</p> <p><u>Low concentration</u> in plankton / lower levels of food chain / eq;</p> <p>Passed on by eating;</p> <p>Bioaccumulation;</p> <p><u>High concentration</u> at top of food chain;</p> <p>Harms / kills top predators;</p>	<p>MP2 must be eating the organisms, not the mercury in the water</p>	<p>Max 4</p>
<b>[Total: 15]</b>			

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4 (a)	<p>Purse seine:- Catches whole schools / large catch; Non target species / bycatch; Loss of diversity / food chain impact / population <u>fall</u>;</p> <p>Benthic trawl:- Dredge along sea bed / eq; Damage reef / coral / sea bed; Loss of habitat (due to physical destruction) / food chain impact;</p> <p>Factory ships: - Freeze catch; Stay at sea long periods; Depletes fish stocks / over fishing;</p>		6 max
(b)	<p>Nursery grounds for fish / eq; (and) crustacean; (fish) survive to breeding age; Stabilises habitat / allows sedimentation; Food for decomposers; Food sources for fish / food chains; Protection from storms / waves;</p>	(Look for idea of protection for <u>juveniles</u> )	4 max
(c)	<p>Benefits:- 1 Prevent extinction / conserve biodiversity; 2 Maintain ecological stability / relationships / eq; 3 Keeps fish (prey) population stable; 4 (seals) are prey for next trophic level;</p> <p>Counter argument:- 5 Commercial damage; 6 Damage to food chains of other species / puffin / common seal / competition / eq; 7 Decrease cod / haddock / sand eel stocks; 8 Decrease competitor species populations / puffins / common seals / eq</p>		5 max
<b>[Total: 15]</b>			