CAMBRIDGE INTERNATIONAL EXAMINATIONS

GCE Advanced Level

MARK SCHEME for the October/November 2013 series

9693 MARINE SCIENCE

9693/04 Paper 4 (Data Handling and 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 October/November 2013 series for most IGCSE, GCE Advanced Level and Advanced Subsidiary Level components and some Ordinary Level components.

CAMBRIDGE
International Examinations

Question/ part	Answers to be awarded credit	Additional Guidance	Mark
1 (a) (i)	Oxygen gas release;		1
(ii)	Provide source of CO_2 / prevent CO_2 limiting photosynthesis/ eq;		1
(iii)	0.10 mms^{-1};; Correct mean of 202 s – one mark;		2
(b) (i)	Ref to 2 peaks of photosynthesis; At 415–425 nm & 655–675 nm ; Lowest rate between 595–605; Ref to highest rate using blue and red light / least for green light;		max 3
(ii)	Chlorophyll; Absorbs light of the two peak wavelengths /eq; Absorbs red and blue parts of the spectrum / reflects or transmits green;		max 2
(c)	CO_2; From respiration;		2
	Total for Question		**11**

2	**(a)**	Organic discharge / waste / excretion products; Decomposition; Ammonium release; Converted to nitrites; (nitrites) converted to nitrate; By nitrifying bacteria; Ref to washed away/ diluted / used up by producers (downstream); Credit another specific species example;	Do not credit direct nitrate release from shrimp waste	3 max
	(b)	Respiration; <u>Bacteria</u> using up oxygen; Less waste downstream; Water mixing with atmosphere / oxygen dissolving in H_2O from atmosphere / release from producers (downstream);		3 max
	(c)	Salmon are faster swimming / have higher respiration rate / eq; (salmon) require more oxygen; Salmon tolerate salinity / eq; Ref to food competition; Ref top turbidity affecting salmon;	Accept converse for all points for carp	3 max
		Total for Question		**9**

3 (a) (i)	Length of DNA coding for polypeptide / protein / characteristics;		1
(ii)	Introducing genes into different species / ref to alteration of DNA / genes / eq;		1
(iii)	DNA found <u>in front</u> of a gene; Controls expression / initiates transcription /eq;		2
(b)	Bacteria / microorganisms / eq; Break down / digest hydrocarbons; Into CO_2 and H_2O; Ref to use of fertilizers;		Max 3
(c)	1. Oil drilling; 2. Damage to sea bed; 3. Ref to oil transportation / tanker accidents/ ballast release; 4. Ref to oil spillage; 5. Death of marine organisms by poisoning / suffocation; 6. Use of antifouling agents (on oil platforms); 7. Bioaccumulation (of paint); 8. Damage to sea bird feathers; 9. Ref to effects on beaches; 10. Effect on food chains; 11. Ref to detergent / hot water / burning off oil; 12. Reduced light penetration (from oil spillage); 13. Ref to CO_2 release from burning; 14. Ref to acidification (from CO_2); 15. Ref to global warming (from CO_2); 16. Ref to reduced oxygen / CO_2 in water (due to oil slick covering water);		Max 8
	Total for Question		**15**

4 (a)	1. ecotourism; 2. energy conservation / use of renewable energy sources; 3. use of solar / wind farms / eq; 4. use of sustainable building materials / minimise damage to trees / forests / eq; 5. use of revenue to sponsor conservation / eq; 6. protection of fragile areas / species at risk; 7. recycling of organic waste / sewage / reuse of water / water filtration / eq; 8. minimal road building / use of public transport / minimise transport / use of bicycles / eq; 9. education of locals / tourists / use of local laws; 10. ref to recycling of solid wastes / refuse collections / minimising plastics / eq		6 max
(b)	1. restrict seasons; 2. allows breeding / eq; 3. restrict location / nursery grounds; 4. allows refuge for breeding / eq; 5. restrict by method (e.g. pole and line / minimum mesh size); 6. only catch target species / reduce catch / allow small fish to escape / eq; 7. restrict by fish size; 8. allow fish time to reach reproductive maturity / eq; 9. restrict boat number / quotas; 10. reduce fishing intensity / catch / eq; 11. marketing ploys; 12. example (e.g. dolphin friendly tins of tuna); 13. ref to laws / inspection / enforcement; 14. patrols / satellite tracking / eq;	Mark in pairs, look for 3 different points.	6 max
(c)	1. ref to dredging sea bottom; 2. damage to sea bed / reefs; 3. catch of non target species; 4. effect on food chains;		3 max
	Total for Question		**15**