UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS

GCE Advanced Subsidiary Level and GCE Advanced Level

MARK SCHEME for the May/June 2012 question paper

for the guidance of teachers

9693 MARINE SCIENCE

9693/02 Paper 2 (AS 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 must be read in conjunction with the question papers and the report on the examination.

- Cambridge will not enter into discussions or correspondence in connection with these mark schemes.

Cambridge is publishing the mark schemes for the May/June 2012 question papers for most IGCSE, GCE Advanced Level and Advanced Subsidiary Level syllabuses and some Ordinary Level syllabuses.

UNIVERSITY of CAMBRIDGE
International Examinations

1 **(a)** Thermocline ;
Accept 'discontinuity layer' [1]

(b) **(i)** 8 °C ; [1]

(ii) 500 m ; [1]

(c) Any **three** of:
1. Reference to decrease ;
2. Reference to high concentration near surface ;
3. Due to oxygen dissolving from atmosphere ;
4. High because of photosynthesis ;
5. Decreases due to respiration ;
6. Rate of respiration greater than rate of photosynthesis ; [3]

[Total: 6]

2 **(a)** Area where a river flows in the sea / eq ;
Reference to dilution of sea water / mixing with freshwater / brackish water / eq ; [2]

(b) **(i)** 745 (per m^2) ; [1]

(ii) 4245 (per m^2) ; [1]

(c) Any **three** of:
1. Results support hypothesis because the mean number of *Hydrobia* is (much) greater than the mean number of *Nereis* ;
2. Reference to sample 1 (or 4) where there were more *Nereis* / reference to exceptions ;
3. Reference to uncertainty ;
4. Idea that you cannot generalise / no repeats ; [3]

(d) Any **three** of:
1. Salinity / eq ;
2. (Availability of) food / nutrients ;
3. (Availability of) oxygen ;
4. Competition ;
5. Predation ;
6. Temperature ;
7. Substrate / eq ;
8. Sedimentation / turbidity / water currents / run-off / pollution ; [3]

(e) **(i)** Reference to inverse relationship / as numbers of *Corophium* increase, numbers of *Hydrobia* decrease ;
Credit a manipulated quantitative description ; [2]

(ii) Reference to <u>competition</u> ;
Competition explained ; [2]

[Total: 14]

3 (a) Any **seven** from:

1. Reference to tides due to gravitational effects of Sun and Moon ;
2. Neap tides smaller range / spring tides greater range ;
3. Neap tides when Sun, Earth and Moon form a right angle / eq ;
4. Neap tides occur when there is a crescent / half moon / eq ;
5. Reduced (gravitational) effect ;
6. Spring tides when Sun, Earth and Moon are in a straight line / eq ;
7. When there is a full Moon / new Moon ;
8. Combined / greater (gravitational) effect ; [7]

(b) (i) Reduced tidal range ; [1]

(ii) Reduced tidal range ; [1]

(iii) Increased tidal range ; [1]

(c) Any **five** from:

1. Idea that water is blown in direction of wind ;
2. Displaced water replaced with deeper water ;
3. This causes upwelling ;
4. Sea floor ridge / eq ;
5. Deflects water upwards ;
6. This also causes upwelling ; [5]

[Total: 15]

4 (a) (i) Coral reefs ; [1]

(ii) Sandy shore ; [1]

(iii) Hydrothermal vent ;
Note: the examples in part (a) are included in the syllabus; there are other acceptable examples. [1]

(b) Any **seven** from:
1. Biodiversity explained as numbers of different species ;
2. (Extreme) reference to high temperature ;
3. Low pH ;
4. Low oxygen availability ;
5. High pressure ;
6. Few organisms adapted to withstand these conditions / eq / named example ;
7. (Unstable) difficult for organisms to attach (to substrate) ;
8. Reference to substrate moving ;
9. Some organisms can burrow / named example ; [7]

(c) Any **five** from:
1. Credit niche explained as role of an organism within an ecosystem / eq ;
2. Credit reference to coral reefs having a high biodiversity ;
3. (Leading to) competition between different species / interspecific competition / mutual exclusion ;
4. E.g. competition for food / space ;
5. Narrow niches reduce competition / overlap of niches / eq ;
6. Credit reference to specialised niche ;
7. E.g. coral-eating fish / parrot fish / butterfly fish ;
8. Open sea has fewer species present ;
9. May be able to exploit a wide(r) range of food sources ;
10. Reduced competition in open sea ;
11. Credit reference to general niche ;
12. E.g. tuna / shark / other oceanic species ; [5]

[Total: 15]