

CAMBRIDGE INTERNATIONAL EXAMINATIONS

GCE Advanced Subsidiary Level

MARK SCHEME for the October/November 2013 series

9693 MARINE SCIENCE

9693/02

Paper 2 (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.

Page 2	Mark Scheme	Syllabus	Paper
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1 (a) *Ascophyllum* on lower part of shore, *Pelvetia* on upper part ;

Ascophyllum more widely distributed than *Pelvetia* ;

Ascophyllum present in 9 samples, *Pelvetia* in 4 samples / *Ascophyllum* from 0 m to 16 m, *Pelvetia* from 20 m to 26 m ;

neither species present at 18 m / at 28 m ;

credit a comparison at a given distance ; [3]

(b) (i) *Pelvetia* is on the upper shore / eq ;

therefore exposed for longer periods of time / accept a converse statement ;

more likely to dry out ;

[accept converse points for *Ascophyllum*] [2]

(ii) reference to taking samples of both species ;

finding initial mass / eq ;

leave samples for stated time ;

leave at stated temperature / temperature range ;

reweigh ;

reference to taking successive readings ;

reference to finding loss in mass ;

loss in mass is due to water loss ;

credit calculation of percentage change in mass ;

reference to repeating experiment (e.g. 'ten samples') ; [5]

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(c) any **TWO** of:

wave action ;

competition ;

presence of herbivores ;

nature of substrate ;

slope ;

availability of nutrients ;

light ;

pollution ;

salinity ;

pH ;

[2]

[Total: 12]

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2 (a) (i) marks awarded for:

a meaningful calculation (e.g. $1.74 \div 6$) ;

correct answer with units (0.29 moles per dm^3) ;

[correct answer with units only gains both marks] **[2]**

(ii) samples taken from different areas / parts of the estuary ;

idea of experimental error / random variation / limitations of technique ; **[2]**

(b) (i) (general point) as the depth increases the salinity also increases ;

reference to little change (in salinity) from 0 m to 8 m / from 32 m to 36 m ;

greater change (in salinity) from 8 m to 32 m / eq / reference to halocline ; **[2]**

(ii) (at surface) idea that low salinity means that the water has a (relatively) low density ;

therefore floats on top of more saline water ;

[accept converse points for high salinity] **[2]**

[Total: 8]

Page 5	Mark Scheme	Syllabus	Paper
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- 3 (a)** (tidal range) is the difference between the low water mark and the high water mark / eq ;
tidal range is greater when there is a full Moon / new Moon ;
Earth, Moon and Sun are in a straight line / at 180° ;
gravitational forces combine / eq ;
reference to Spring tides ;
tidal range is smaller when there is a crescent Moon / eq ;
Earth, Moon and Sun at right angles ;
reduces gravitational effect ;
reference to neap tides ; **[8]**
- (b) (i)** tidal range will decrease / eq ; **[1]**
(ii) tidal range will increase / eq ; **[1]**
- (c)** in winter months / October to December, sea warmer than land ;
air over the sea (warms and) rises ;
(this) draws air from the land ;
from the north-east ;
in summer months / May to August, land is warmer than the sea ;
air over the land rises ;
(this) draws air from the Indian Ocean ;
from the south-west ; **[5]**

[Total: 15]

Page 6	Mark Scheme	Syllabus	Paper
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- 4 (a) (i) an organism which obtains energy / eq ;
from another organism / feeding on another organism ; [2]
- (ii) rate of accumulation of, energy / biomass ;
per unit area / per unit volume ;
credit suitable units, e.g. kJ per ha per year ; [2]
- (b) nitrogen for formation of amino acids / proteins ;
carbon for synthesis of all organic compounds / named example ;
reference to fixation of carbon dioxide by producers / named example ;
calcium for teeth / bones / shells ;
calcium for formation of corallite / calcium carbonate ;
in corals / formation of coral reefs ; [5]
- (c) temperature and effect on solubility of oxygen ;
atmospheric pressure and effect on solubility of oxygen ;
wave action and effect on oxygen concentration ;
photosynthesis produces oxygen ;
respiration uses oxygen ;
light penetration and photosynthesis ;
depth and concentration of dissolved oxygen ; [6]

[Total: 15]