



UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS  
General Certificate of Education  
Advanced Subsidiary Level and Advanced Level

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**MARINE SCIENCE**

**9693/02**

Data-Handling and Free-Response  
SPECIMEN MARK SCHEME

**For Examination from 2008**

**1 hour 15 minutes**

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**MAXIMUM MARK: 50**

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This document consists of **4** printed pages and **0** blank pages.



- 1 (a) coral polyps/algae/zooxanthellae ;  
they are, producers/autotrophs ;  
can use inorganic nitrogen compounds ; [max 2]
- (b) decreases (with distance from reef crest) ;  
relatively constant/fluctuates, to, 600/900 m, then falls ; [2]
- (c) (i) support ;  
something must be removing nitrate from the water ; [2]
- (ii) only done twice/perhaps nitrate ions were at different depths/other ; [1]
- (iii) take further sets of readings and average/take sets of readings at different  
depths/other ; [1]
- (d) (i) loss of energy ;  
ref to friction ; [2]
- (ii) results show that *rate* of uptake appears to be greatest between 600 to 1200 m then  
falls;  
lower (rate of) uptake, on reef flat/from 1200 m onwards, correlates with lower velocity  
(of water) ; [2]
- [Total: 12]**
- 2 (a) (i) salinity increases with greater distance from land ; [1]
- (ii) rivers flow in from land ;  
dilution ;  
evaporation removes water (but not salt) ; [2 max]
- (b) salinity affected by precipitation – evaporation ;  
the greater this difference the lower the salinity/vice versa ;  
difference (between p and e) is greatest at around 20° N or S/lowest near equator ; [3]
- (c) type of sediment (require relatively small particle size) ;  
depth of sediment (require fairly deep sediment) ;  
exposure (require fairly sheltered shore) ;  
temperature (tropical or subtropical) ; [2 max]
- [Total: 8]**

3 (a) position in a food chain/food web ;  
example of marine producer and consumer ; [2]

(b) example of predator and prey ;

population sizes may be related ;  
predator population size smaller than prey population size ;

when predator relies heavily on one prey species ;  
availability of prey may be a limiting factor (for predator population size) ;  
oscillations described ;  
one follows the other/not synchronised/time lag ;

population spatial distributions may be related ;  
predator may follow prey ;

[5 max]

(c) *tuna*

improves chances of finding prey/more individuals to sense prey ;  
improves chances of catching prey ;  
simultaneous attack may cause shoal of prey to break up ;

*sardines*

predator protection ;  
odds of an individual fish being eaten are small(er) ;  
improves chances of detecting predators/more individuals to sense predators ;  
'fear' chemicals secreted which warn all individuals ;  
synchronised movements/appearance, confuses predators ;

*either*

better success at navigation (for migration) ;  
easier to move through the water/slipstream effect ;  
ref to reproduction, e.g. better chance of fertilisation ;

[8 max]

**[Total: 15]**

4 (a) reef in open ocean ;  
ring/horseshoe shape ;  
enclosing lagoon ; [max 2]

(b) coral colonizes in shallow water ;  
around edge of volcanic island ;  
forms fringing reef ;  
island subsides ;  
or sea level rises ;  
reef grows, vertically/towards the surface ;  
eventually island completely drowned ;  
ref. to time scale (up to 30 m years) ; [max 5]

(c) deep drilling ;  
ref to example e.g. Marshall Islands/Bikini Atoll/other ;  
  
shows coral deposits on top of, volcanic rock/basalt ;  
fossil corals dated ;  
using carbon dating ;  
description of carbon dating ;  
corals lived around, 30 m/55 m, years ago ;  
  
coral deposits now very deep ;  
more than 1000 m ;  
known to grow only 50 m below surface ;  
so the top of the reef must have originally been much higher than now ;  
this is evidence that sea level has risen/bedrock has eroded ;  
  
soils on atolls relatively young ;  
around 3500 years old ;  
matches dates of post-glacial period ;  
supports hypothesis that sea level fall exposed reef platform (to erosion) ; [max 8]

**[Total: 15]**