



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

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**MARINE SCIENCE**

**9693/04**

Data-Handling and Free-Response

**For Examination from 2009**

SPECIMEN MARK SCHEME

**1 hour 15 minutes**

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**MAXIMUM MARK: 50**

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This document consists of **5** printed pages and **1** blank page.



**Section A**

1 (a) CPUE values correctly filled in ;

0.73  
1.71  
1.32  
1.08  
3.36  
3.47  
2.58  
4.08  
2.32  
1.42

[1]

(b) all points correctly plotted (ecf for wrong calculations in (a)) ;  
points joined by line ;

[2]

(c) steady decline in the catch amount ;  
steady decline in the CPUE ;  
at the same time there is an increase in the amount of fishing effort ;

[2 max]

(d) decline in CPUE means less fish are being caught for the same amount of work ;  
indicating that there are fewer fish to be caught ;

[2]

(e) ref. to illegal/unreported catch ;  
size/sex of fish caught ;  
location of catch ;

[3]

**[Total: 10]**

- 2 (a) lower concentration of dissolved salts ;  
details ;; [2 max]
- (b) to replace water lost ;  
because body fluids less concentrated than sea water ;  
ref. to osmosis ; [2 max]
- (c) respiration ;  
ref. to mitochondria being site of respiration ;  
ref. to more mitochondria more respiration occurs/more energy available for NKA pump ;  
[2 max]
- (d) with increase in salinity there is increase in number of chloride channels ;  
straight line/directly proportional/quote figures ; [2]
- (e) idea that less water lost (by osmosis) ;  
less sea water taken in/water taken in contains less salt ;  
less active NKA pumps ;  
less energy required to maintain concentration of body fluids ; [2 max]

**[Total: 10]**

- 3 (a) tourism involving travel to areas of natural/ecological interest ;  
 under the guidance of a naturalist ;  
 for the purpose of observing wildlife/learning about the environment ;  
 managed to be ecologically sustainable ; [2 max]
- (b) minimizes the adverse affects of hotels, trails, and other infrastructure ;  
 use of recycled materials/available local building materials/renewable sources of energy ;  
 recycling/safe disposal of waste and garbage ;  
 raise funds for environmental protection/research/education ;  
 park entrance fees/tour company, hotel, airline and airport taxes/voluntary contributions ;  
 builds environmental awareness ;  
 education, for both tourists and residents of nearby communities ;  
 local community receive income ;  
 other tangible benefits (potable water, roads, health clinics, etc.) from the conservation area/  
 tourist facilities ;  
 encourages rural development ;  
 shift economic and political control to the local community, village, cooperative ; [8 max]
- (c) air travel often not included in the “environmental impact calculation” ;  
 10,000 km flight consumes about 700 litres of fuel per person ;  
 destinations often extremely sensitive to environmental impact from human use ;  
 e.g. coral reefs/bird breeding colonies in Antarctica ;  
 damaged even by careful travellers. ;  
 involves travel to remote areas where small/isolated communities have had little experience  
 interacting with foreigners ;  
 ecotourism involves an unequal relationship of power between the visitor and the host/  
 commodification of the relationship through exchange of money ; [5 max]

**[Total: 15]**

- 4 (a) fusion of (haploid) gametes ;  
details egg and sperm  
producing diploid zygote ; [2]
- (b) producing few young, typically one to eight ;  
strategy of reproduction spawns few offspring ;  
but provides each with a high rate of survival ;  
devoting effort to protecting them while they grow to adulthood ;  
ref K-selection strategy ;  
large brain/need to learn requires parental care ;  
parental care includes feeding ;  
ref. mammary glands ;  
maximize the chances that each individual calf will grow to maturity ;  
successful in stable environments ;  
few, large, well-developed young and protect through prolonged parental care ; [8 max]
- (c) large numbers of tiny young into the environment, providing little or no parental care afterwards ;  
significant losses due to predation ;  
populations are subject to wide fluctuations of relative abundance ;  
makes them poor colonizers of stable environments ;  
responsible for the phenomenon known as 'year class' among commercial fisheries ;  
when environmental conditions are poor, very few or no young may survive to breed ; [5 max]

**[Total: 15]**

