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9693/02

May/June 2012

1 hour 15 minutes

No Additional Materials are required.

READ THESE INSTRUCTIONS FIRST

DO **NOT** WRITE IN ANY BARCODES.

Answer **all** questions.

The number of marks is given in brackets [] at the end of each question or part question.

For Examiner's Use	
1	
2	
3	
4	
Total	

This document consists of **10** printed pages and **2** blank pages.

Section A

Answer **both** questions in this section.

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- 1 Fig. 1.1 shows how the temperature and the concentration of dissolved oxygen vary with depth in the Arabian Sea.

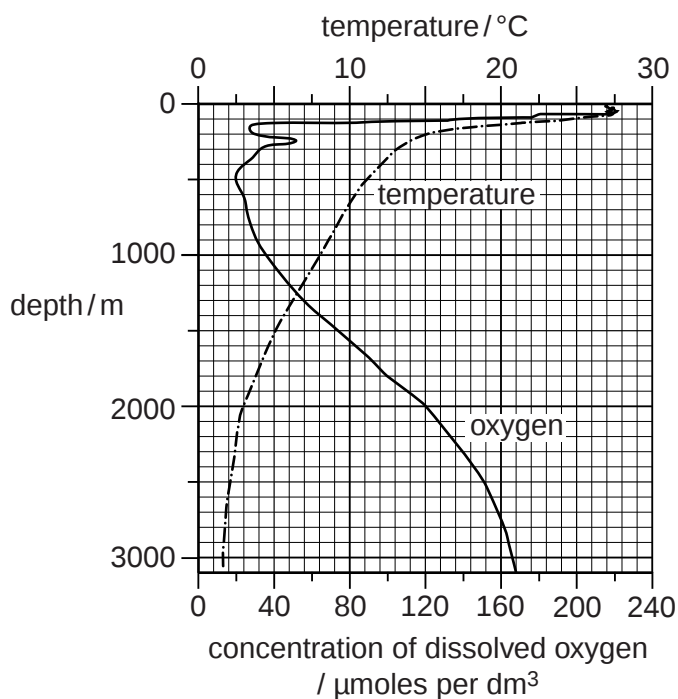


Fig. 1.1

- (a) State the term used to describe the region in which the gradient of temperature change is greatest.

..... [1]

(b) Use Fig. 1.1 to find each of the following.

(i) the temperature at a depth of 1000 m

..... [1]

(ii) the depth at which the concentration of dissolved oxygen is $20 \mu\text{moles per dm}^3$

..... [1]

(c) Describe the change in the concentration of dissolved oxygen as the depth increases from 0 m to 100 m. Suggest an explanation for this change.

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..... [3]

[Total: 6]

- 2 An investigation was carried out into the abundance of two organisms living in the mud of an estuary, *Nereis* (a species of worm) and *Hydrobia* (a species of mollusc).

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The numbers of each species were counted in ten 0.25 m² sample areas, numbered 1 to 10. The numbers per m² were then calculated.

The results are shown in Table 2.1.

Table 2.1

sample area	1	2	3	4	5	6	7	8	9	10
number of <i>Nereis</i> in 1 m ²	240	600	2000	1700	800	1100	720	260	30	0
number of <i>Hydrobia</i> in 1 m ²	0	1200	2500	1100	2600	1200	5600	10 100	18 100	50

- (a) Explain what is meant by the term *estuary*.

.....

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..... [2]

- (b) Calculate the mean numbers per m² for each species.

- (i) *Nereis*

..... [1]

- (ii) *Hydrobia*

..... [1]

- (c) Using the results of this investigation, the researchers put forward the following hypothesis.

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The population of *Hydrobia* in an estuary is greater than the population of *Nereis*.

Do the experimental results support or refute this hypothesis? Give an explanation for your answer.

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..... [3]

- (d) Suggest **three** environmental factors that could affect the numbers of *Hydrobia* and *Nereis* per m² in an estuary.

1

2

3 [3]

- (e) In a further investigation, the researchers counted the numbers of *Hydrobia* and the numbers of *Corophium* (a small shrimp-like organism) living together in the same area. *Corophium* lives in the upper layer of mud in estuaries and feeds on plankton.

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The results are shown in Table 2.2.

Table 2.2

numbers of <i>Corophium</i> per 0.01 m ²	mean number of <i>Hydrobia</i> per 0.01 m ²
1 – 10	110
11 – 20	90
21 – 30	45
31 – 40	19
41 – 50	8
51 – 60	2
61 – 70	0
71 – 80	0
81 – 90	0
91 – 100	0

- (i) Using the information in Table 2.2, describe the relationship between the numbers of *Corophium* and the mean numbers of *Hydrobia*.

.....

 [2]

- (ii) Suggest an explanation for the relationship you have described.

.....

 [2]

[Total: 14]

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Turn over for Section B

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..... [7]

[1]

(ii) an increase in atmospheric pressure

.....
..... [1]

(iii) an increase in the size of a body of water.

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..... [1]

(c) Explain how wind and the shape of the sea bed produce ocean currents and upwelling.

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..... [5]

[Total: 15]

(i) stable and not extreme

(ii) unstable

(iii) extreme

(b) Explain why extreme and unstable marine environments tend to have a relatively low biodiversity.

..... [7

- (c) Suggest why coral reefs tend to contain narrower ecological niches than the open sea.

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..... [5]

[Total: 15]

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Copyright Acknowledgements:

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Question 2 © *The Ecology of a Mud-Flat*; http://sabella.mba.ac.uk/1154/01/A_preliminary_study_of_the_ecology_of_a_mud-flat.pdf.

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