Cambridge International AS & A Level

Cambridge International Examinations
Cambridge International Advanced Subsidiary and Advanced Level

CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER

8179157877

MARINE SCIENCE **9693/02**

Paper 2 AS Data Handling and Free Response **October/November 2014**

1 hour 15 minutes

Candidates answer on the Question Paper.

No Additional Materials are required.

READ THESE INSTRUCTIONS FIRST

Write your Centre number, candidate number and name on all the work you hand in.
Write in dark blue or black pen.
You may use an HB pencil for any diagrams or graphs.
Do not use staples, paper clips, glue or correction fluid.
DO **NOT** WRITE IN ANY BARCODES.

Answer **all** questions.

At the end of the examination, fasten all your work securely together.
The number of marks is given in brackets [ ] at the end of each question or part question.

Electronic calculators may be used.
You may lose marks if you do not show your working or if you do not use appropriate units.

For Examiner's Use	
1	
2	
3	
4	
Total	

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

CAMBRIDGE International Examinations

Section A

Answer **both** questions.

1 Periwinkles, illustrated in Fig. 1.1, are molluscs found commonly on rocky shores.

Fig. 1.1

An investigation was carried out into the distribution of two different species of periwinkles, the edible periwinkle and the rough periwinkle, on a rocky shore.

The distribution of these two species was investigated using a quadrat with an area of 0.25 m^2. The quadrat was placed at two metre intervals from the low water mark and the numbers of each species within the quadrat were recorded.

The results are shown in Table 1.1.

Table 1.1

distance from low water mark / m	numbers of edible periwinkles per 0.25 m^2	numbers of rough periwinkles per 0.25 m^2
2	4	0
4	3	0
6	2	0
8	0	0
10	2	0
12	4	0
14	0	0
16	0	1
18	0	1
20	0	4
22	0	2
24	0	8
26	0	16
28	0	7
30	0	0

(a) Using the data in Table 1.1, compare the distribution and numbers of these two species of periwinkles.

.....

.....

.....

.....

.....

.....

..... [4]

(b) Suggest **three** physical factors which could influence the distribution of periwinkles on a rocky shore.

1 .....

2 .....

3 .....

[3]

(c) Suggest how limitations in the method for this investigation could lead to uncertainty in the results.

.....

.....

.....

..... [2]

(d) The population density is defined as the number of individuals of a species per unit area.

Describe how you could determine the mean population density of edible periwinkles on a rocky shore.

.....

.....

.....

.....

.....

..... [3]

[Total: 12]

2 Sea lice are parasites of a number of different species of fish, including salmon.
Investigations have been carried out to study the effect of sea lice on swimming endurance in salmon.

In one experiment, groups of young salmon, each infected with 1, 2, 3 or 4 sea lice, were placed in horizontal plastic tubes, as shown in Fig. 2.1. A group of uninfected fish was also used.

Sea water was pumped through the tubes. The chemical composition of the sea water was carefully controlled.

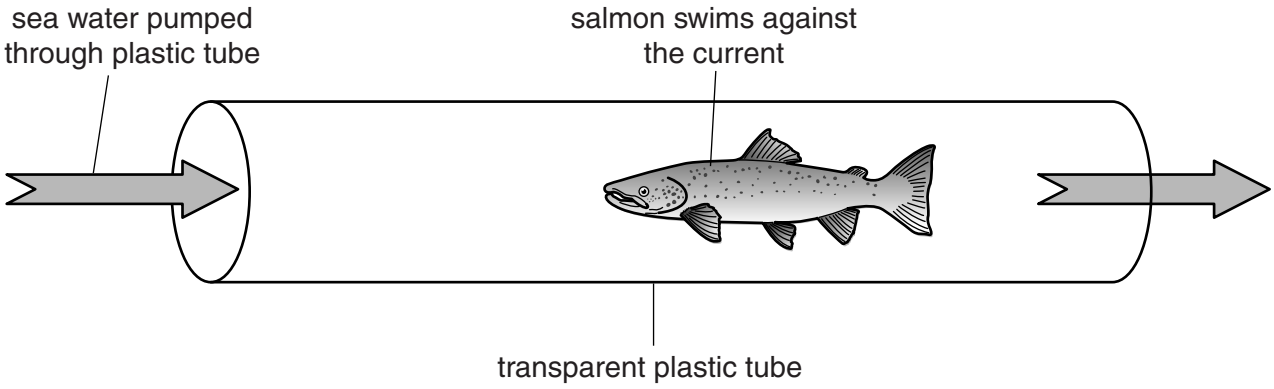

Fig. 2.1

Fish were observed in the plastic tubes and the numbers of salmon which were able to swim continuously for 30 minutes were recorded.

The mean length of each group of salmon was also recorded.

The results of this investigation are shown in Table 2.1

Table 2.1

number of sea lice infecting each salmon	mean length of salmon / mm	percentage of each group able to swim continuously for 30 min
0	54.9	60
1	54.9	46
2	54.3	40
3	55.4	42
4	53.7	0

(a) With reference to the data in Table 2.1, suggest why sea lice are considered to be parasites of salmon.

.....

.....

.....[2]

(b) Suggest **two** chemical properties of sea water that were kept constant in this experiment.

1 .....

2 .....
[2]

(c) Suggest why the mean length of each group of salmon was recorded.

.....[1]

(d) From the results of this experiment, the researchers put forward the following hypothesis:

As the number of sea lice infecting salmon increases, the swimming endurance of the fish decreases.

Do the results in Table 2.1 support or refute this hypothesis? Give an explanation for your answer.

.....

.....

.....

.....

.....[3]

[Total: 8]

Section B

Answer **both** questions.

3 **(a)** Describe how temperature and salinity gradients form in the oceans.

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....[6]

(b) The concentration of dissolved oxygen in sea water varies.

Suggest and explain what effect each of the following would have on the concentration of dissolved oxygen:

(i) an increase in wave action

.....

.....

.....[2]

(ii) an increase in the temperature of water in a shallow lagoon.

.....

.....

.....[2]

(c) Explain why India may experience heavy rainfall during the months of June until September.

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....[5]

[Total: 15]

4 **(a)** Describe the conditions required for the growth of corals.

.....

.....

.....

.....

.....

.....

.....

.....[4]

(b) Describe the methods used for reconstructing the history of coral reefs.

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....[8]

(c) Artificial reefs are constructed from a variety of materials including concrete blocks and sunken ships.

State **three** benefits of artificial reefs.

1 .....

2 .....

3 .....
[3]

[Total: 15]

BLANK PAGE

BLANK PAGE