



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

CANDIDATE  
NAME

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NUMBER

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**MARINE SCIENCE**

**9693/03**

Structured Questions

**May/June 2010**

Paper 3

**1 hour 30 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 on both sides of the paper.

You may use a soft pencil for any diagrams, graphs or rough working.

Do not use staples, paper clips, highlighters, glue or correction fluid.

**DO NOT WRITE IN ANY BARCODES.**

Answer **all** questions.

Write your answers in the spaces provided on the question paper.

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.

| For Examiner's Use |  |
|--------------------|--|
| 1                  |  |
| 2                  |  |
| 3                  |  |
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| 5                  |  |
| 6                  |  |
| 7                  |  |
| <b>Total</b>       |  |

This document consists of **15** printed pages and **1** blank page.



- 1 (a) Kelp forests that include many species of brown algae occur in cold, nutrient-rich water throughout the world in shallow open coastal waters. The larger forests are found only at temperatures less than 20°C and grow in both the Arctic and Antarctic Circles. Their growth rate is one of the fastest known, varying from 10cm to 30cm per day in some species.

Fig. 1.1 shows a species of brown alga that occurs in kelp forests.

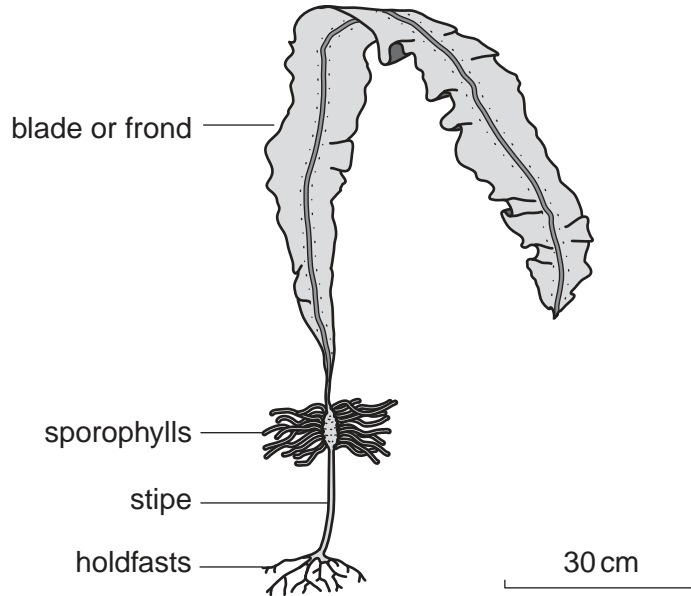


Fig. 1.1

- (i) Name **two** nutrients required by kelp and explain why they are important for its growth.

1 nutrient .....

function .....

2 nutrient .....

function .....

.....[4]

(ii) With reference to Fig. 1.1, suggest why typhoons and El Niño effects cause almost complete loss of kelp forests.

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..... [3]

(b) Suggest **two** roles of kelp forests in the marine ecosystem.

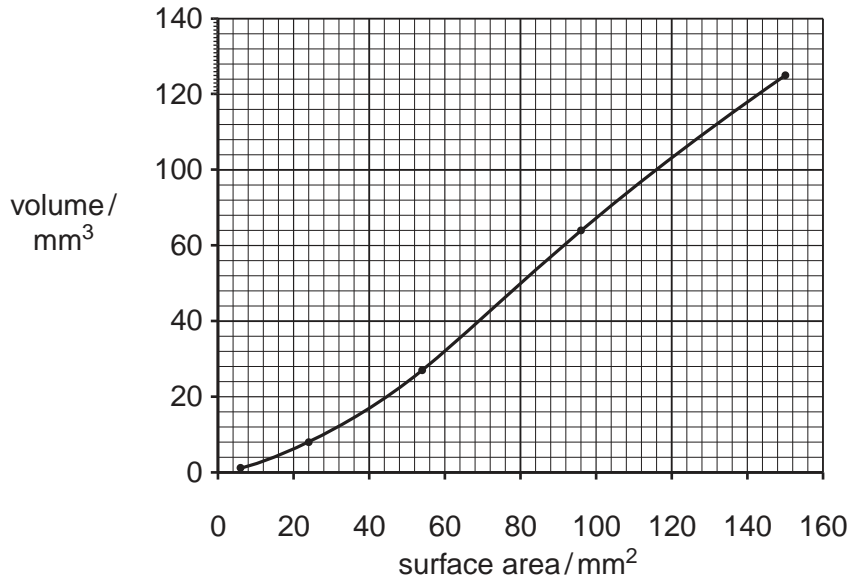
1 .....  
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2 .....  
..... [2]

[Total: 9]

2 (a) State what is meant by the term *diffusion*.

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

(b) Fig. 2.1 shows the relationship between surface area and volume of a cube.



**Fig. 2.1**

(i) Describe the relationship shown by Fig. 2.1.

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 .....  
 ..... [2]

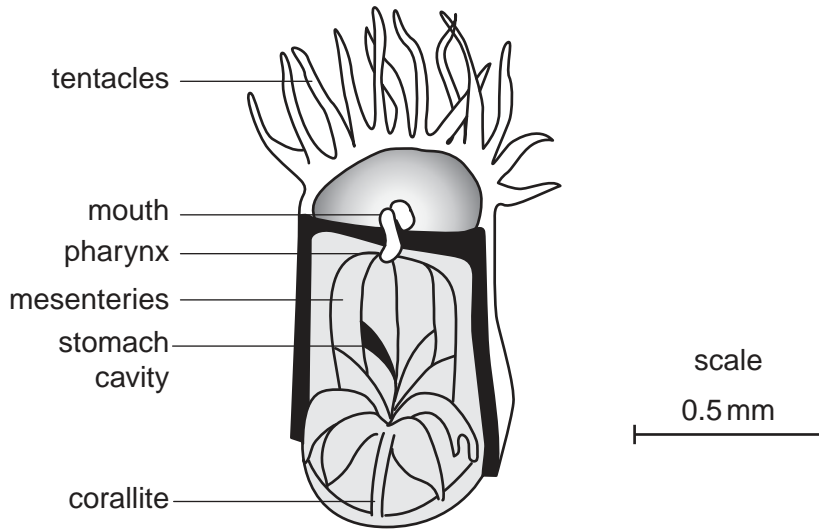
(ii) The movement of oxygen and carbon dioxide into and out of cells occurs by diffusion.

Describe how increasing the size of a cell will affect diffusion of these gases.

.....  
 .....  
 .....  
 ..... [2]

- (c) Corals are multicellular organisms that require a constant supply of oxygen from the water. Fig. 2.2 shows a section through a coral polyp.

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**Fig 2.2**

- (i) Suggest how the structure of the polyp is adapted so that diffusion of oxygen directly into the cells is sufficient for its needs.

.....  
.....  
.....  
.....[3]

- (ii) Explain why diffusion directly to cells is not sufficient to meet the oxygen needs of a multicellular organism such as a marine fish.

.....  
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.....  
.....[3]





- 3 (a) Shrimps and oysters are human food resources that can be harvested directly from the sea, or from aquaculture.

- (i) State **two** features of the life cycle that are common to both shrimps and oysters.

1 .....

.....

2 .....

..... [2]

- (ii) State **one** difference in the adult stage of the life cycle of shrimps and oysters.

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..... [1]

- (b) Adult oysters and larval shrimps both inhabit intertidal and estuarine habitats.

Explain why these habitats are advantageous for both adult oysters and larval shrimps.

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..... [2]

- (c) Table 3.1 shows the time for each stage in the life cycle of one type of shrimp in a natural environment and in aquaculture.

**Table 3.1**

| stage in life cycle | time /days          |             |
|---------------------|---------------------|-------------|
|                     | natural environment | aquaculture |
| egg                 | 1                   | 1           |
| nauplius            | 2–3                 | 1           |
| zoea                | 2–3                 | 1–2         |
| mysis               | 4–5                 | 2–3         |
| post larva          | 28–42               | 14–20       |
| juvenile            | 175–210             | 105–140     |



(i) Suggest **two** reasons why shrimps in aquaculture complete their life cycle faster than shrimps in their natural environment.

1 .....

.....

2 .....

..... [2]

(ii) Shrimps have been reared in Asia for hundreds of years in mangrove estuaries.

Suggest the advantages to the environment of this type of extensive system of aquaculture.

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..... [3]

[Total: 10]

4 The World Wide Fund for Nature has reported on the state of the world fisheries. Some of the conclusions were:

- 52% of the world's fisheries are fully exploited, and 24% are overexploited, depleted, or recovering from depletion.
- Seven of the top ten marine fisheries, accounting for about 30% of all capture fisheries production, are fully exploited or overexploited.
- As many as 90% of all the oceans' large fish have been fished out.
- Several important commercial fish populations have declined to the point where their survival is threatened.
- Unless the current situation improves, stocks of all species currently fished for food are predicted to collapse by 2048.

(a) The World Wide Fund has recommended changes to fishing practices to limit ecological damage such as habitat destruction.

Explain how each of the following might reduce ecological damage.

(i) a ban in 2005 on bottom trawling in the Mediterranean sea at depths below 1000m

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..... [3]

(ii) a ban on the use of gill nets at depths below 200m by the European Union and stopping the use of gill nets by New Zealand

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(iii) a European Union decision to help Morocco phase out their illegal drift net fleet

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(b) Explain the difficulties in enforcing fishing restrictions.

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..... [4]

[Total: 13]

5 Untreated domestic waste water consists of sewage, used washing and bath water.

Fig. 5.1 shows regions of the world where untreated domestic waste water is dumped into the sea.

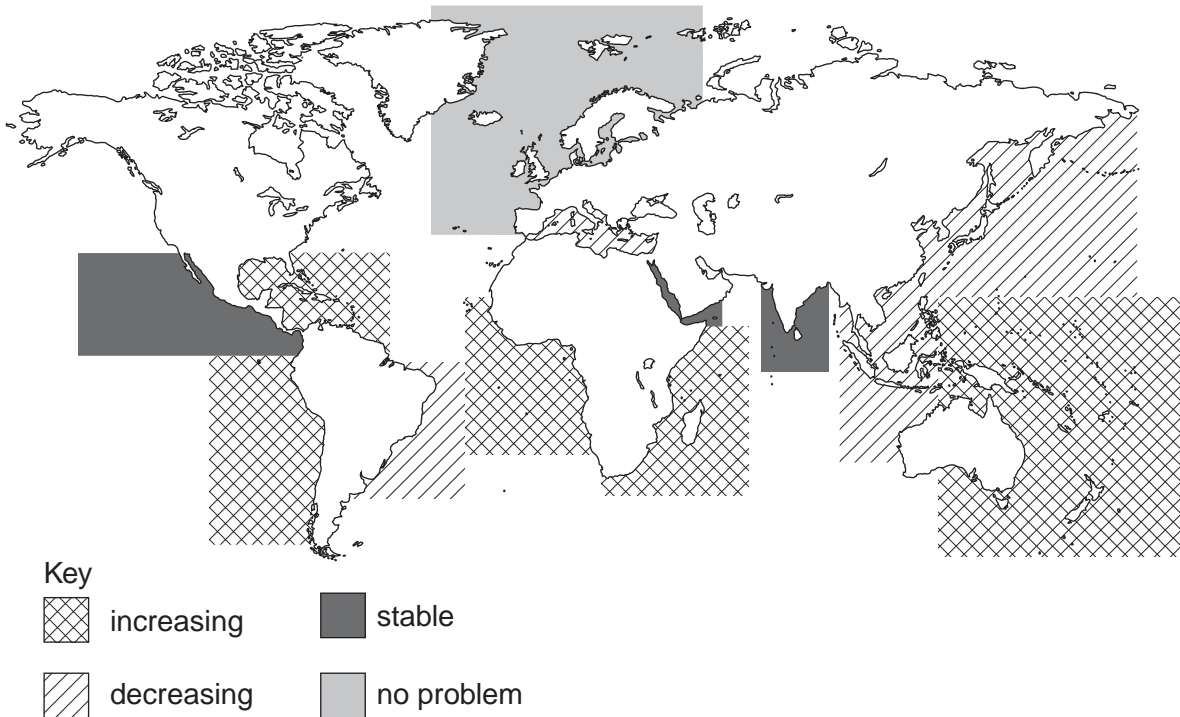


Fig 5.1

(a) (i) In some parts of the world, the quantity of untreated domestic waste water being dumped into the sea is increasing.

Suggest **two** reasons for this increase.

1 .....

.....

2 .....

..... [2]

(ii) Explain **two** ways in which untreated domestic waste water is a danger to the marine environment.

1 .....

.....

.....

2 .....

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..... [4]

(b) Suggest why oysters and shrimps harvested from regions with high levels of human sewage in the water are banned from sale as human food.

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..... [3]

(c) Explain why the use of antifouling paints is discouraged by environmental groups.

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..... [3]

[Total: 12]

6 (a) Fig. 6.1 shows part of a coastline and island being considered for development as a tourist resort.

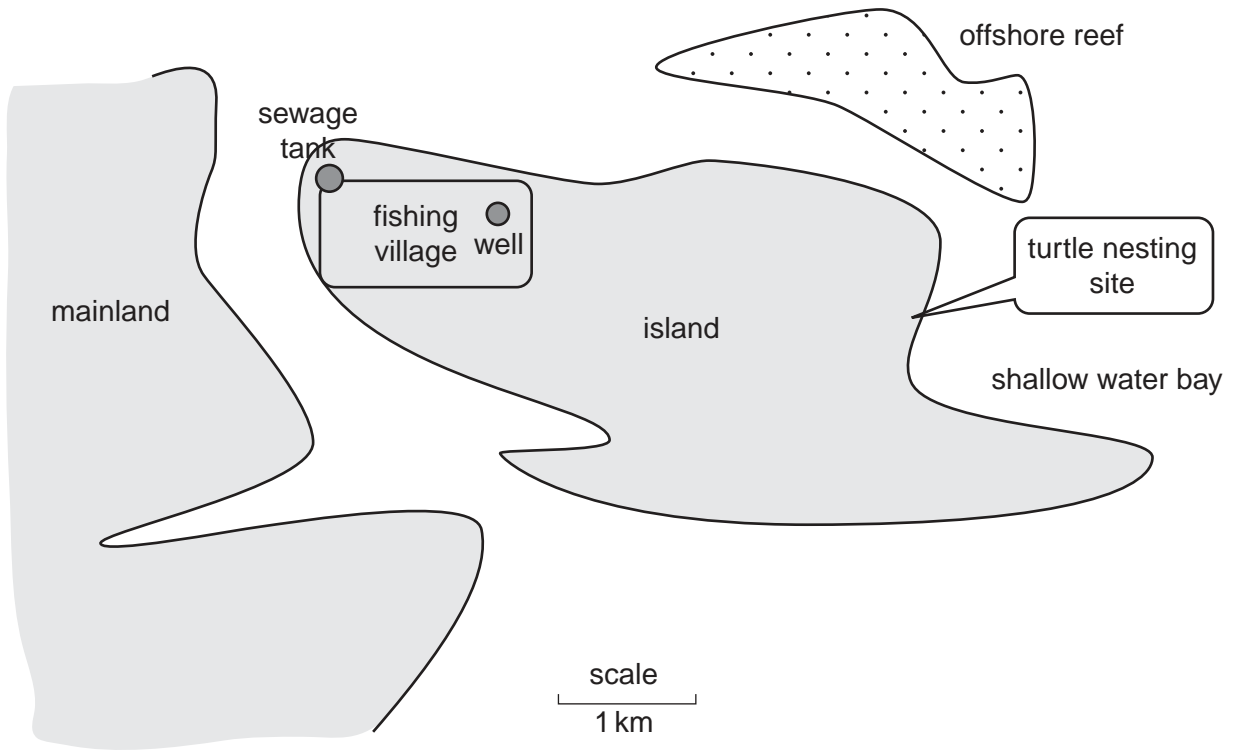


Fig. 6.1

The proposal for developing a tourist resort include:

- hotel complex
- a bridge linking the mainland to the resort
- airport
- deep water landing port
- water sport complex

(i) The overseas development company presented their plan for the development of this tourist resort at a meeting with local people.

Suggest **three** arguments the development company might use in favour of their plan.

1 .....

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2 .....

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3 .....

..... [3]

(ii) Suggest **three** objections that the local people might make against this development.

*For  
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1 .....

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2 .....

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3 .....

.....[3]

(b) Suggest **one** way in which the limitations of existing facilities of the island could be a problem to this proposed development.

.....

.....[1]

[Total: 7]

7 (a) Define the term *biotechnology*.

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

(b) One use of biotechnology is to protect shore lines from the effects of oil spillage. The threatened beaches and solid surfaces are coated with a liquid sludge consisting of microorganisms attached to a harmless support material. Oil reaching the shore binds to the support material and is spread out into a thin layer.

(i) Name **one** source of oil pollution.

..... [1]

(ii) Explain why microorganisms are used in the liquid sludge.

.....  
.....  
.....  
..... [2]

(iii) Suggest **two** advantages of using the support material.

1 .....  
.....  
2 .....  
..... [2]

(iv) Suggest why this method of protection is not used until a shore line is threatened by an oil spillage.

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

[Total: 7]

Copyright Acknowledgements:

Question 4a © *Poorly managed fishing; Sustainable fishing eliminating destructive practice*; World Wildlife Fund.  
Question 5a © Gees von deGuchte Van de Weerd; *Our Planet, pamphlet P3*; [www.gpa.unep.org](http://www.gpa.unep.org); GPA Coordination Unit.

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