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

CANDIDATE NAME	
CENTRE NUMBER	
CANDIDATE NUMBER	

7139754549

MARINE SCIENCE **9693/03**

Structured Questions **October/November 2011**

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	
4	
5	
6	
7	
Total	

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

1 The distribution of two species of seaweed, **A** and **B**, was investigated on a reef at different depths from the water surface.

For Examiner's Use

The population of each species was estimated by their percentage cover. To find the percentage cover, an area is measured and the proportion of the reef covered by each species within this area is estimated.

The distribution of a grazing herbivore, which feeds on seaweed, was also estimated using the same method.

Fig. 1.1 shows the results of the investigation.

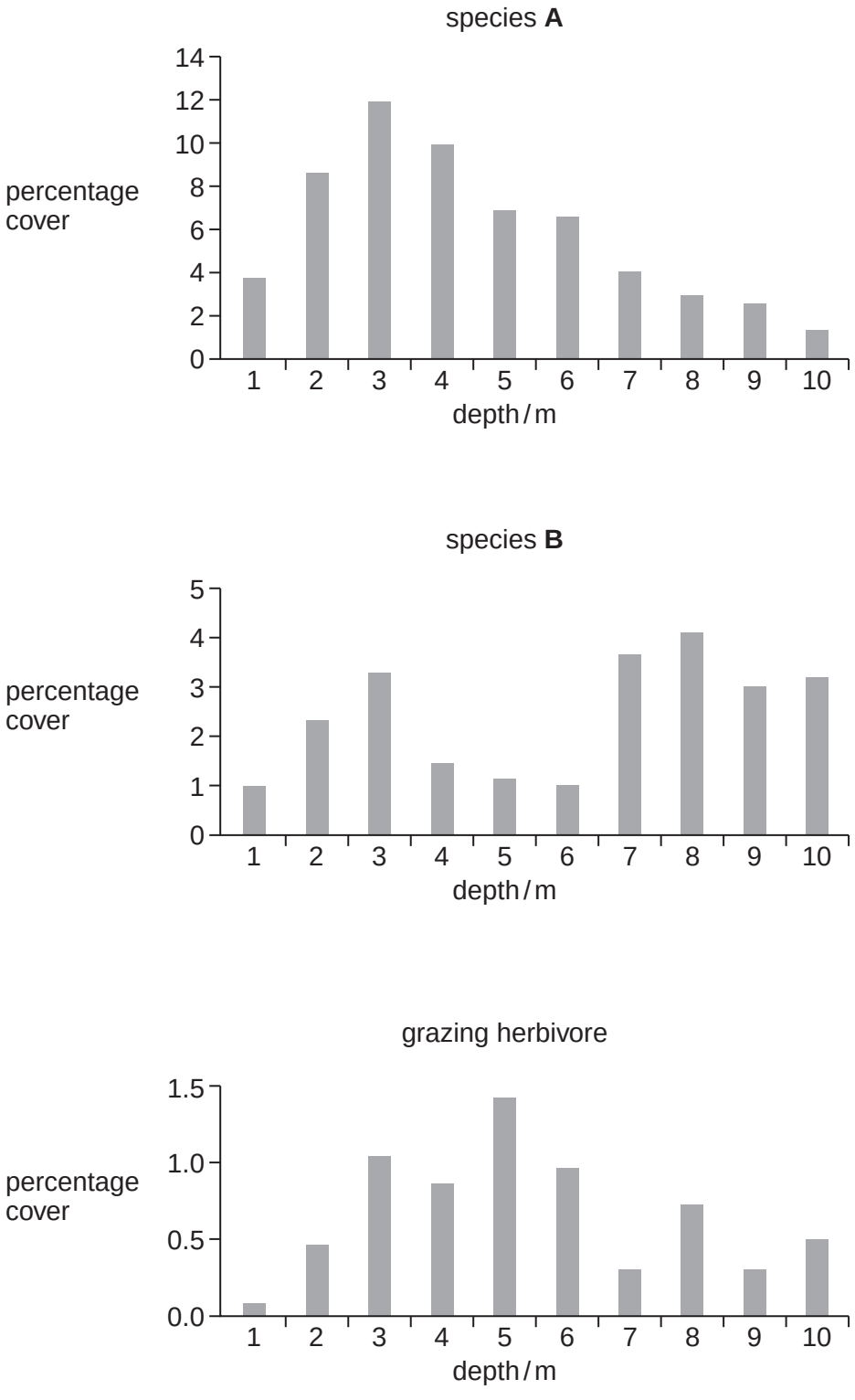

Fig. 1.1

(a) **(i)** Using the information in Fig. 1.1, describe the distribution of the two species of seaweed.

.....

.....

.....

.....

.....

..... [3]

(ii) Suggest how the grazing herbivore may have influenced the distribution of these species of seaweed.

.....

.....

.....

.....

..... [3]

(b) Species **A** is a large kelp. On other reefs this kelp forms dense forests.

Suggest **two** factors in the location that may have influenced the distribution of species **A** on the reef studied.

1. .....

2. ..... [2]

(c) On a rocky shore there is a variety of species of green, brown and red algae in the intertidal region.

State the expected distribution of these algae in this region. Give an explanation for your answer.

.....

.....

.....

.....

.....

.....

.....

..... [3]

[Total: 11]

[Turn over

2 **(a)** The sea anemone *Anthopleura elegantissima* has a symbiotic relationship with a dinoflagellate *Gymnodidium microadriaticum*.

(i) State the role of dinoflagellates in the ecosystem.

..... [1]

(ii) State what is meant by the term *symbiotic relationship*.

.....

..... [1]

(b) Sea anemones with symbiotic dinoflagellates were separated into two groups. Each group was kept in seawater at 20 °C.

One group was fed with dried shrimp and the other group was not fed.

The ratio of photosynthesis: respiration of these anemones was measured.

The contribution made by the dinoflagellate to the respiratory carbon of the sea anemone was also calculated.

Table 2.1 shows the results of the investigation.

Table 2.1

group of sea anemones	ratio of photosynthesis : respiration of sea anemones	contribution by dinoflagellates to respiratory carbon of sea anemones (%)
fed with dried shrimp	0.93	12.90
not fed	2.55	42.80

(i) Using the information in Table 2.1, describe the effect of not feeding the sea anemones on each of the following.

1. The ratio of photosynthesis : respiration of sea anemones.

.....

.....

2. The contribution made by the dinoflagellates to the respiratory carbon of sea anemones.

.....

..... [3]

(ii) Suggest an explanation for these effects.

For Examiner's Use

.....

.....

.....

..... [3]

(c) Fig. 2.1 shows the structure of a sea anemone.

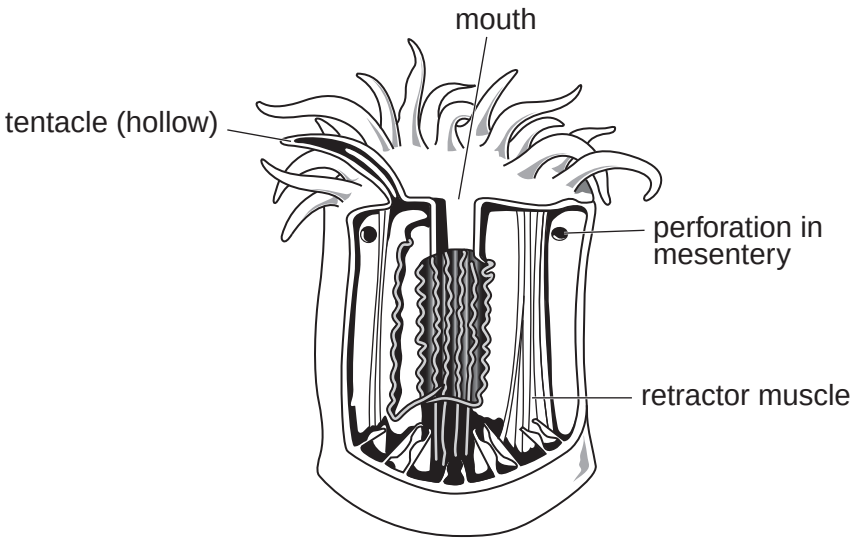

Fig. 2.1

The mouth opens into a water filled central cavity surrounded by two layers of cells. At intervals, the body contracts forcing water out of the mouth. As the body extends more water enters the cavity.

(i) Anemones depend only on diffusion for gas exchange. With reference to Fig. 2.1, give an explanation.

.....

.....

.....

.....

.....

..... [3]

(ii) Suggest why the water in the central cavity is replaced at regular intervals.

.....

.....

..... [2]

[Total: 13]

3 **(a)** Fig. 3.1 shows the life cycle of an oyster.

For Examiner's Use

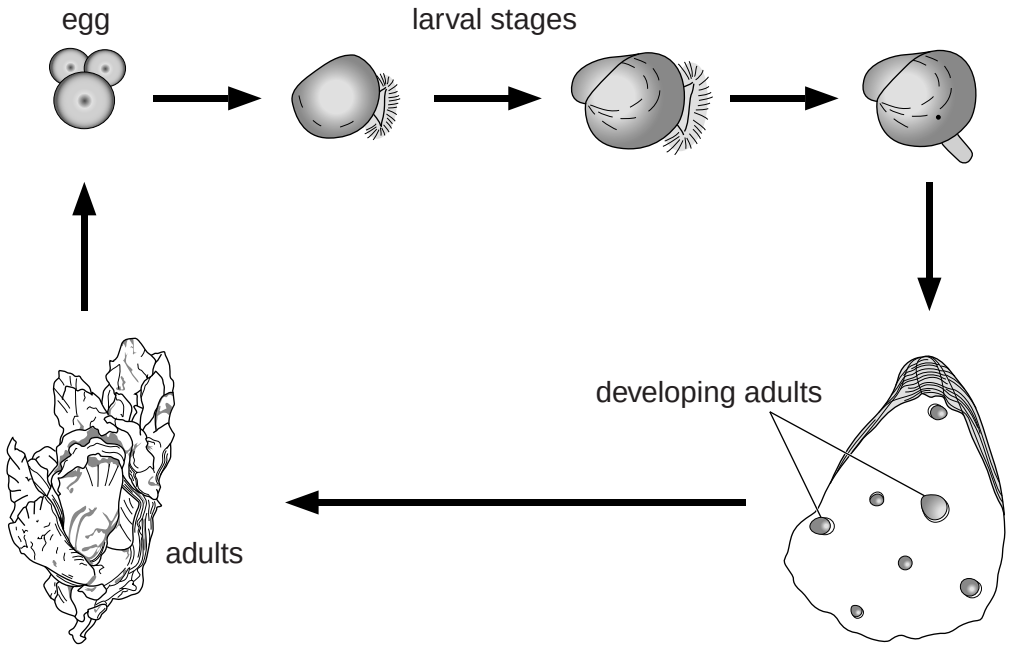

Fig. 3.1

(i) Name the stages in the life cycle of the oyster shown in Fig. 3.1 that are free-living.

State the habitat where these free-living stages are found.

names of the free-living stages .....

.....

habitat ..... [2]

(ii) State one feature of the habitat of the free-living stages of an oyster that helps them to survive.

.....

..... [1]

(iii) Describe the habitat of an adult oyster and explain its advantage to the oyster.

.....

.....

.....

.....

.....

..... [3]

(b) Suggest **two** reasons, other than providing food, why oysters are important to other organisms living in the same habitat.

For Examiner's Use

1. .....

.....

2. .....

..... [2]

(c) Suggest why, during aquaculture of oysters, the salinity and temperature of the water is controlled.

.....

.....

.....

.....[2]

[Total: 10]

For Examiner's Use

4 **(a)** **(i)** State what is meant by the term *aquaculture*.

.....

..... [1]

(ii) State **two** differences between intensive and extensive aquaculture systems.

1. .....

.....

2. .....

..... [2]

(b) Salmon have been reared by aquaculture for many years.

Fig. 4.1 shows the main stages of an aquaculture system for the Atlantic salmon.

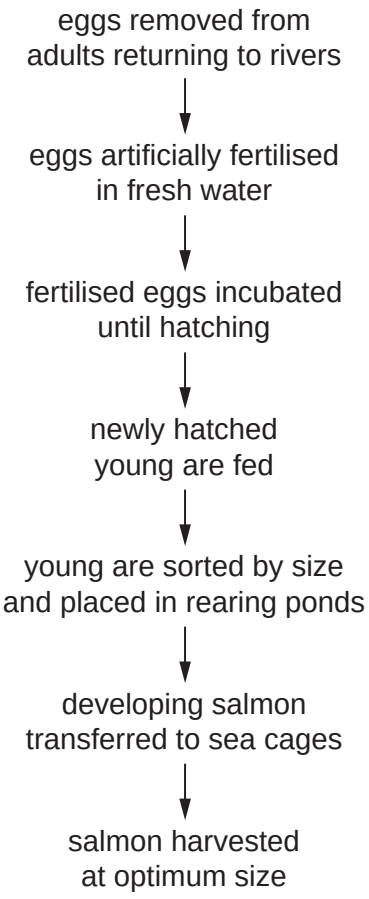

Fig. 4.1

(i) Explain why developing salmon are transferred from fresh water to sea cages.

.....

.....

..... [2]

(ii) Suggest **two** reasons why this system described for the Atlantic salmon may cause an environmental problem in the sea.

1. .....

.....

2. .....

..... [2]

(c) Fig. 4.2 shows the world aquaculture of salmon from 1995 to 2006.

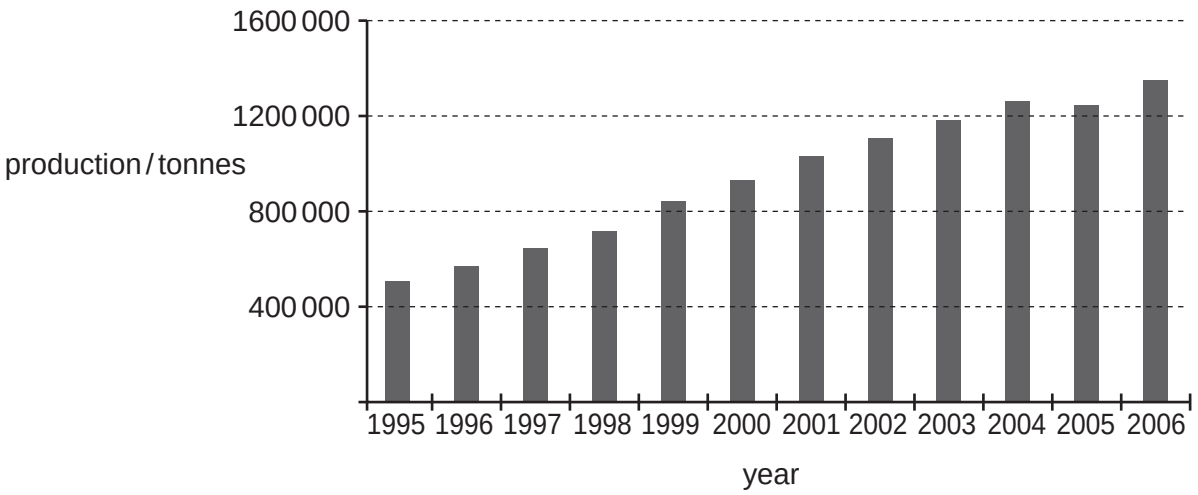

Fig. 4.2

(i) State the trend shown by this graph.

..... [1]

(ii) Suggest **two** consequences of this trend to the wild salmon population.

1. .....

.....

2. .....

..... [2]

[Total: 10]

5 **(a)** State what is meant by the term *global warming*.

For Examiner's Use

.....

..... [1]

(b) The mean global temperature between 1850 and 2000 was calculated.
Fig. 5.1 shows the variation in the annual global temperature based on data from the UK Meteorological Office.

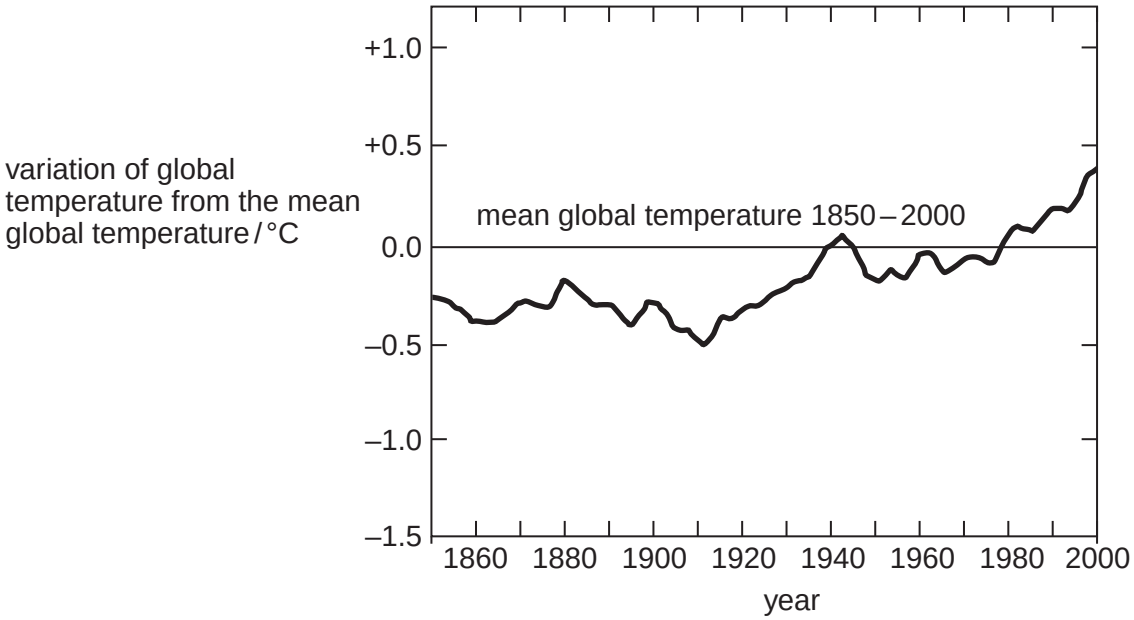

Fig. 5.1

(i) Explain what the information in Fig. 5.1 shows about the change in global temperature since 1940.

.....

.....

..... [2]

(c) It is possible that some organisations adjust their temperatures on global warming.

Suggest **two** reasons why organisations producing data about global warming may adjust their data on temperatures related to global warming.

1 .....

.....

2 .....

..... [2]

(d) (i) State **one** piece of evidence used to support the view that humans are responsible for global warming.

For Examiner's Use

.....

..... [1]

(ii) Outline the possible effects of global warming on the marine ecosystem.

.....

.....

.....

.....

.....

..... [3]

[Total: 9]

6 **(a)** State **three** reasons that may be given for the development of a coastal environment.

For Examiner's Use

1. .....

.....

2. .....

.....

3. .....

..... [3]

(b) A coastal town has expanded greatly over a period of fifteen years. The present refuse and sewage disposal system can no longer cope with the extra waste.

Fig. 6.1 is a map of the town showing the location of the present disposal sites. The proposed sites for a new sewage treatment works and refuse disposal site are also shown.

The sewage treatment works will be connected to the existing pipe that opens into the river mouth.

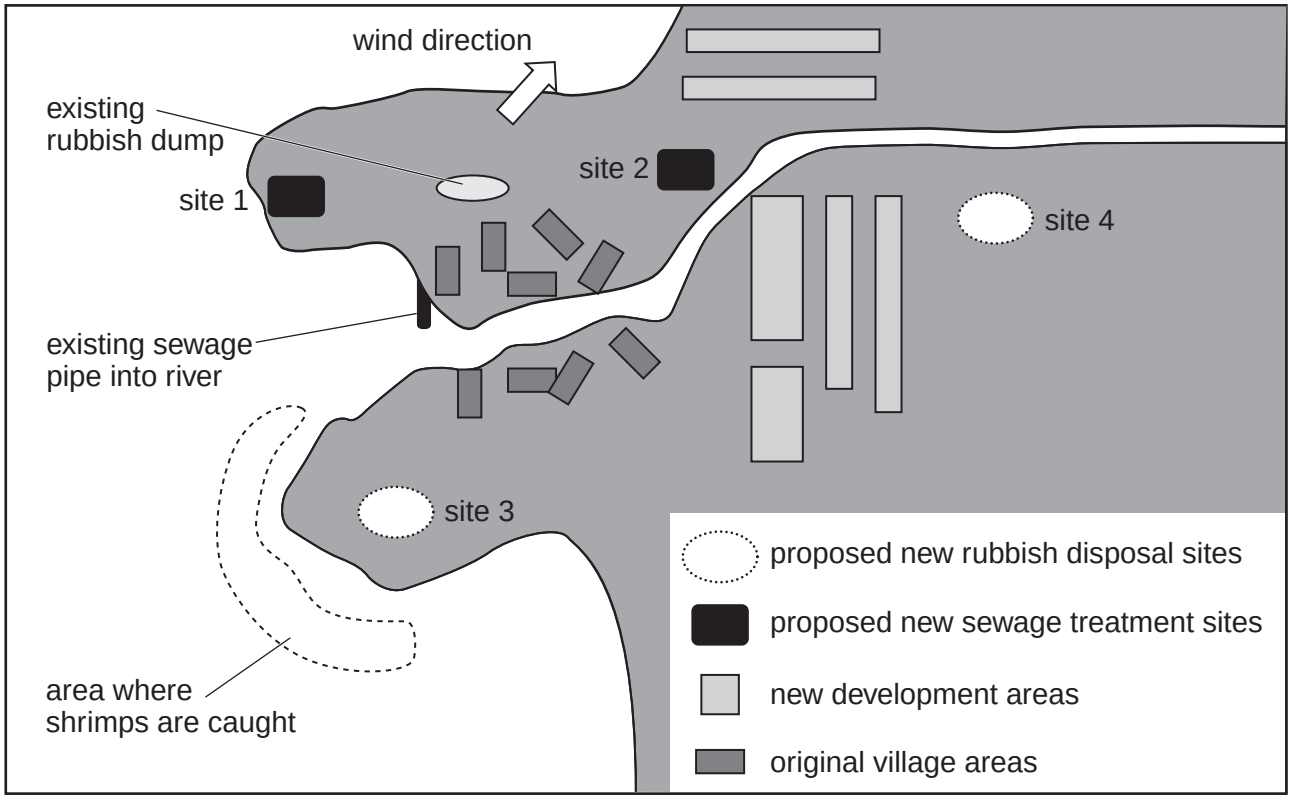

Fig. 6.1

(i) Suggest why site 1 might be more suitable than site 2 for the proposed sewage treatment works.

.....

.....

.....

..... [2]

(ii) The local government chose site 3 for the new refuse disposal. An environmental group organised a protest meeting about this choice.

Suggest, with reasons, **one** argument that the protest group might make against site 3.

.....

.....

.....

.....

.....

.....

.....

..... [4]

(c) The existing sewage pipe empties untreated sewage into the water. The new sewage treatment works will collect sewage from the whole town and process it.
The treated sewage has fewer solids and no disease-causing organisms.

Suggest why the treated sewage may improve the quality of the shrimps caught.

.....

.....

..... [2]

[Total: 11]

7 **(a)** Define the term *genetic engineering*.

.....

..... [2]

For Examiner's Use

(b) Fig. 7.1 shows some of the events during genetic engineering of salmon.

Complete Fig. 7.1 by writing the missing word or words on the dotted lines. [2]

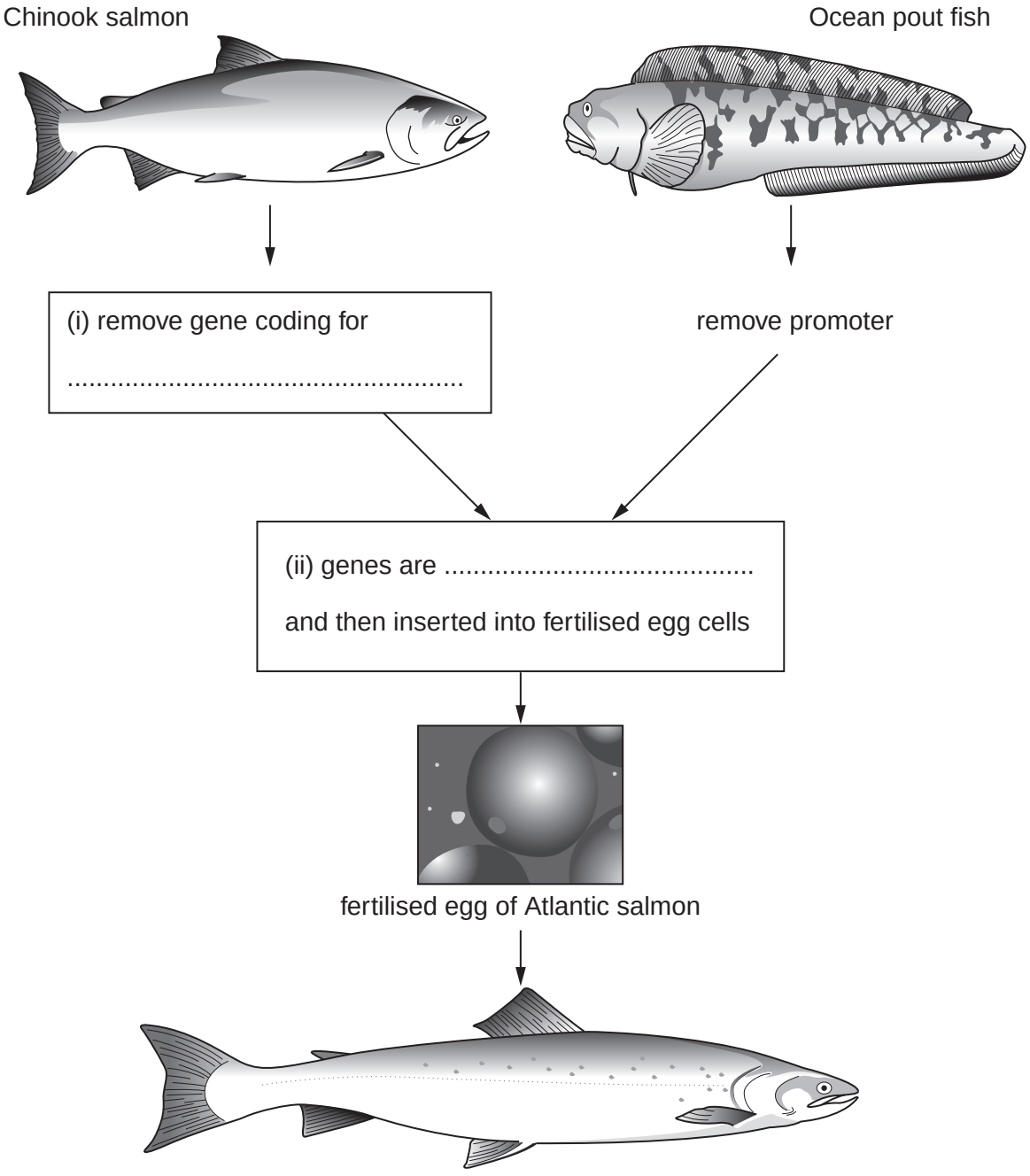

Fig. 7.1

(c) Outline the function of promoter genes and state the function of the promoter gene in genetically engineered salmon.

For Examiner's Use

.....

.....

.....

.....

.....

..... [3]

(d) **(i)** Explain why genetically engineered salmon are reared only in aquaculture.

.....

.....

.....

.....

.....

..... [3]

(ii) Suggest **one** advantage of rearing genetically modified salmon by aquaculture instead of non-genetically modified salmon.

.....

..... [1]

[Total: 11]

BLANK PAGE