Centre Number	Candidate Number	Name

CAMBRIDGE INTERNATIONAL EXAMINATIONS
General Certificate of Education Ordinary Level

FISHERIES SCIENCE **5151/01**

Paper 1

October/November 2003

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 in the spaces provided on the Question 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.

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.

If you have been given a label, look at the details. If any details are incorrect or missing, please fill in your correct details in the space given at the top of this page.

Stick your personal label here, if provided.

For Examiner's Use	
1	
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Total	

This document consists of **18** printed pages and **2** blank pages.

UNIVERSITY of CAMBRIDGE
Local Examinations Syndicate
[Turn over

1 Fig. 1.1 shows some organisms in a coral reef system.

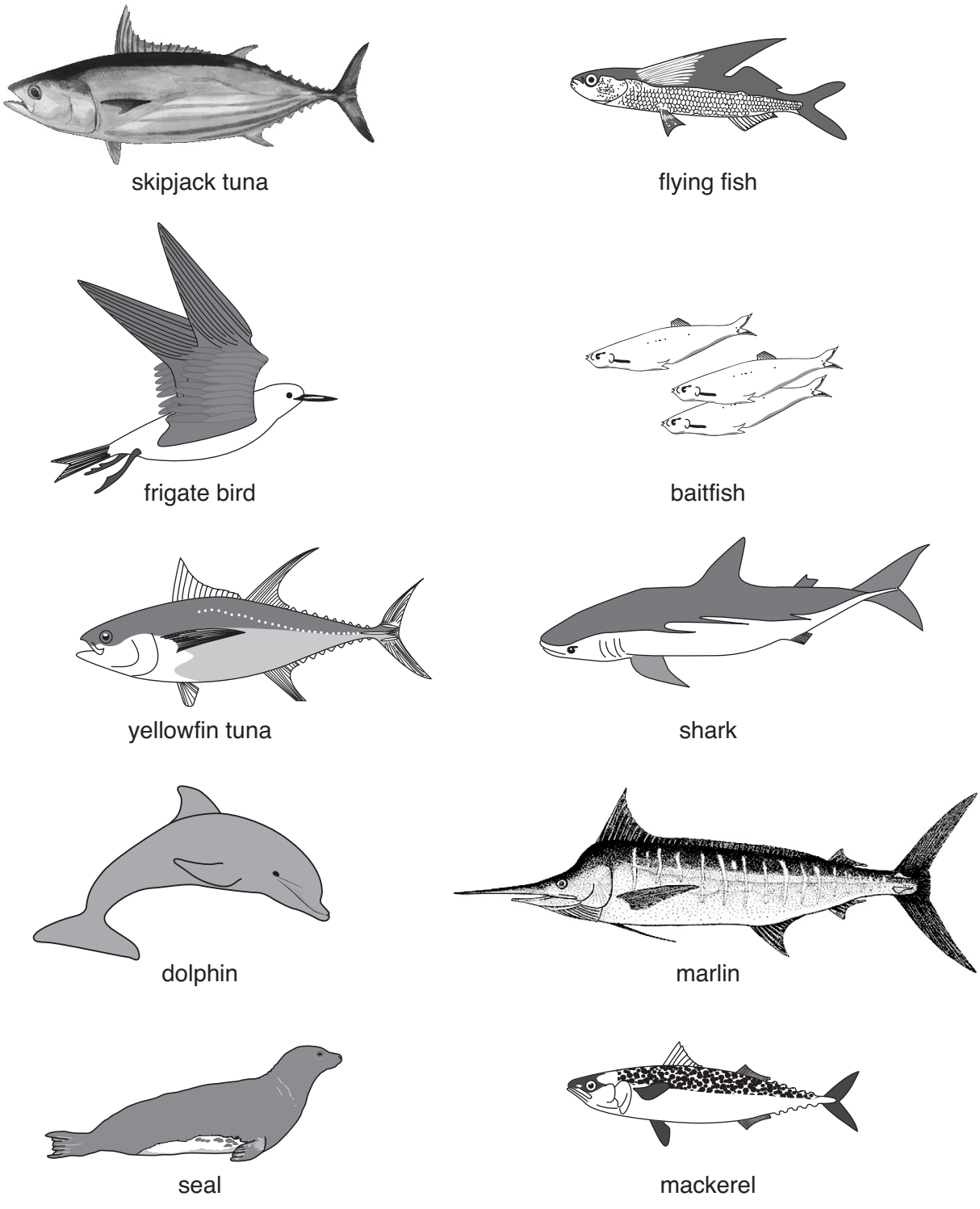


Fig. 1.1

(a) Complete the two food chains using organisms in Fig. 1.1.

food chain 1

phytoplankton → zooplankton → ……

→ …….. .

food chain 2

phytoplankton → zooplankton → …….

→ …….. → ……. .

[2]

(b) State the initial source for all energy in food chains such as those in **(a)**.

.....[1]

(c) Explain why, in any ecosystem, there are only a few top predators.

.....

.....[2]

[Turn over

2 **(a)** Fig. 2.1 below shows a cross-section of a coral polyp.

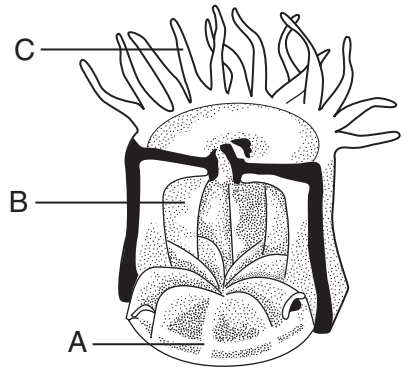


Fig. 2.1

State **one** function of each of the following parts.

A .....

.....

B .....

.....

C .....

.....[3]

(b) The diagram below shows the structure of a nematocyst.

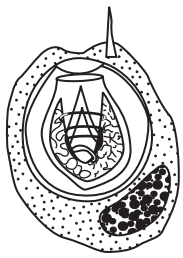


Fig. 2.2

Describe how the nematocyst in Fig. 2.2 is used to help to capture food.

.....

.....

.....

.....[3]

3 Skipjack tuna is caught at the surface, mostly with pole-and-line gear, purse seines and accidentally by drift longlines. Fish aggregating devices (FADs) have greatly increased the size of the catch of skipjack tuna.

(a) (i) Describe drift longlining.

.....

.....

.....

.....[3]

(ii) Suggest a reason why an FAD increases the size of the catch.

.....

.....[1]

(b) The fisheries scientist's job is to collect and analyse data. Advice can then be given on how to exploit the stocks. Some of the data collected are about fishing effort and fish catch.

(i) Using the axes provided, draw a graph to show fishing effort against time (for example, over the last twenty five years).

[1]

(ii) Explain what is meant by *catch per unit effort* (CPUE).

.....

.....[2]

(c) The maximum sustainable yield (MSY) is an important piece of data. It is defined as the point where the population growth (recruitment and growth of the stock) equals the rate of fishing. Describe what would happen if the fishing effort goes beyond this point.

.....

.....

.....[2]

[Turn over

4 Fig. 4.1 shows world fisheries production and utilisation from 1990 to 1996.

PRODUCTION (million tonnes)	1990	1992	1994	1996
INLAND				
Aquaculture	8.17	9.39	12.11	15.61
Capture	6.59	6.25	6.91	7.55
Total inland	14.76	15.64	19.02	23.16
MARINE				
Aquaculture	4.96	6.13	8.67	10.78
Capture	79.29	79.95	85.77	87.07
Total marine	84.25	86.08	94.44	97.85
COMBINED				
Total aquaculture	13.13	15.52	20.78	26.39
Total capture	85.88	86.20	92.68	94.62
Total world fisheries	99.01	101.72	113.46	121.01
UTILISATION				
Human consumption	70.82	72.43	79.99	90.62

Fig. 4.1

(a) Describe what has happened to total world fisheries production over this period.

.....

.....[1]

(b) By how many million tonnes has the inland production increased between 1990 and 1996?

.....[1]

(c) The marine capture total has remained relatively stable from 1994 to 1996. In this two year period there have been large increases in the catch of some marine species. Why has the total catch **not** increased much in this period?

.....

.....[1]

(d) The total marine catches from the main fishing areas in the Atlantic Ocean have levelled off in recent years. Suggest **two** reasons for this.

1 .....

.....

2 .....

.....[2]

[Turn over

5 **(a)** List **three** things that a mariner's chart shows.

1 .....

2 .....

3 .....[3]

(b) To help to locate the position of a place, charts are divided up by two sets of lines. Name and briefly describe each set of lines.

1 .....

.....

2 .....

.....[4]

(c) Fig. 5.1 shows a chart of the Maldives.

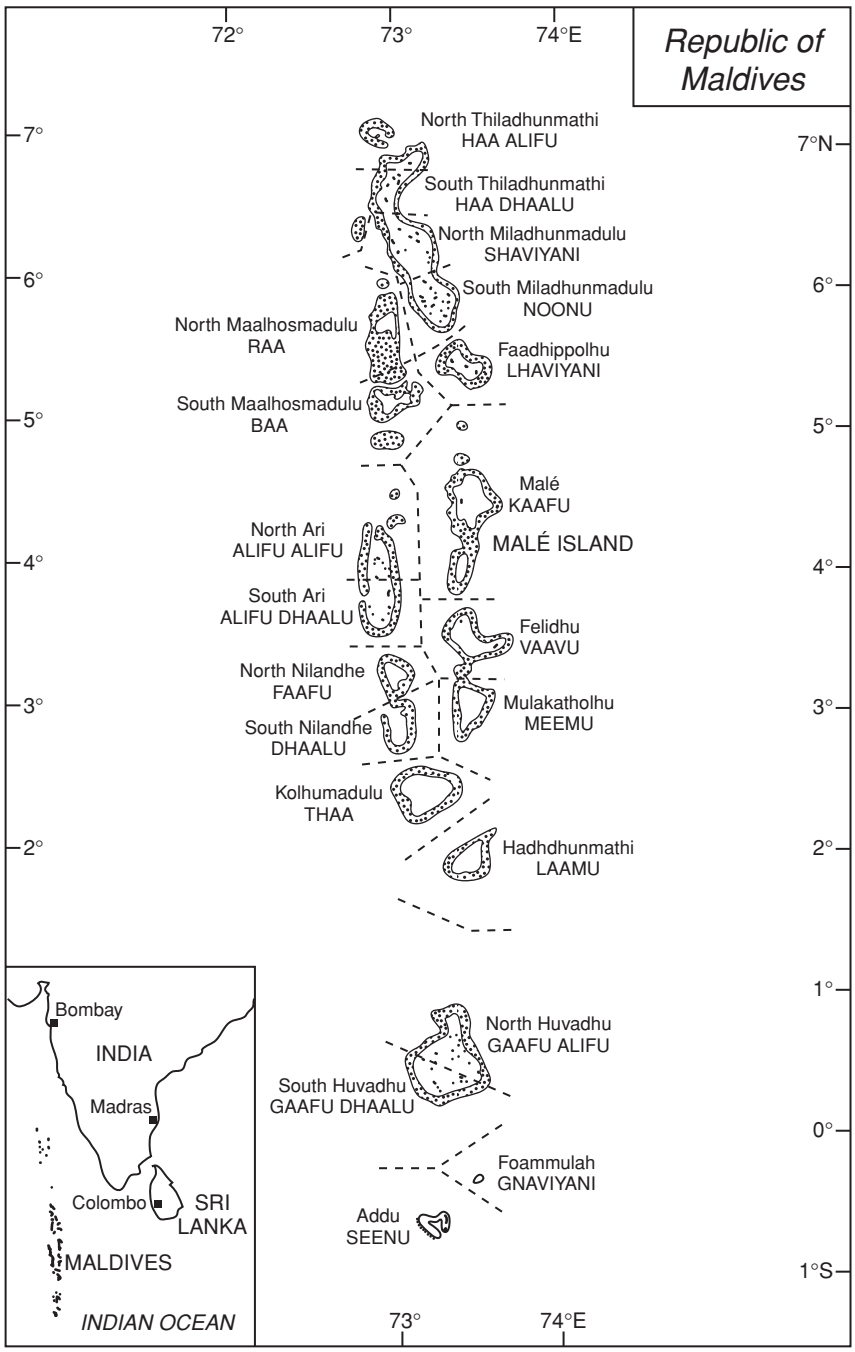


Fig. 5.1

Using this chart, estimate the position of South Thiladhunmathi atoll.

.....

.....

.....[3]

[Turn over

6 **(a)** Define aquaculture.

.....

.....

.....

.....[4]

(b) Aquaculture has a number of advantages and disadvantages when compared to fishing methods that catch wild stock.

(i) Give **one** advantage.

.....

.....[1]

(ii) Give **one** disadvantage.

.....

.....[1]

(c) Fig. 6.1 shows world cultured aquatic production for the most commonly-used species in 1996.

common name of cultured organism	production (million tonnes)
Japanese carpet shell	1.12
Pacific cupped oyster	2.92
Nile tilapia	0.60
silver carp	2.88
crucian carp	0.69
kelp	4.17
yesso scallop	1.27
grass carp	2.44
common carp	1.99
bighead carp	1.41

Fig. 6.1

Answer the following questions using the information in Fig. 6.1.

(i) State which organism had the highest production in 1996.

.....[1]

(ii) Suggest **one** reason why the Nile tilapia is suitable for farming in the Maldives.

.....

.....[1]

[Turn over

7 In the Maldives, large areas of reef flats have been degraded by mining coral for the construction industry.

(a) Reefs have also been degraded by natural events. State **one** natural event that will harm a reef.

.....[1]

(b) One action taken to re-establish coral communities in the Maldives is the introduction of artificial reefs. State another action that has been taken.

.....[1]

(c) Four different types of artificial reef structure have been used in an experiment at Galu Falhu. Fig. 7.1 shows the tonnes of fish biomass per hectare before and after making each type of artificial reef.

type of artificial reef	fish biomass / tonnes per hectare	
	before	after
chain-link fencing	0.4	0.4
mined control	0.2	0.1
plain armorflex	0.4	1.5
SHEDs	0.2	4.6
transplanted armorflex	0.4	2.1

Data adapted from An evaluation of artificial reef structures as tools for marine habitat rehabilitation in the Maldives by S Clark and A J Edwards. Aquatic Conservation: Marine Freshwater Ecosystems 5-21 (1999)

Fig. 7.1

(i) Using the theoretical results in Fig. 7.1, complete the labelling on Fig. 7.2.

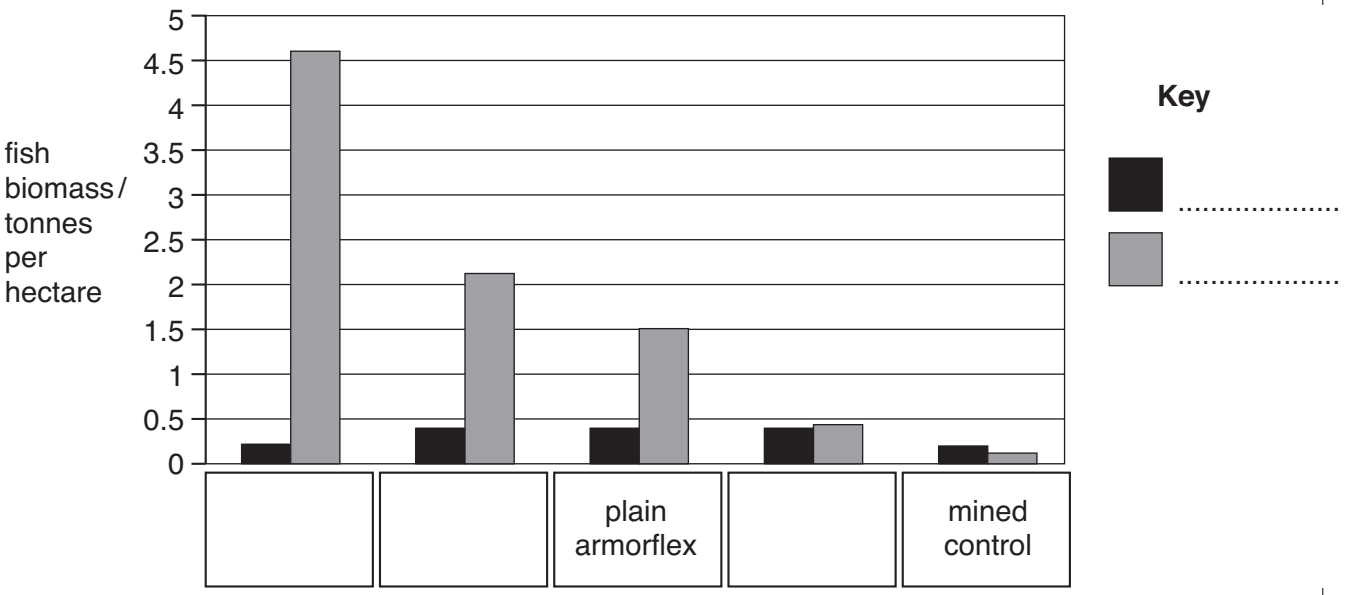


Fig 7.2

[5]

(ii) State the best surface for attracting coral recruits.

.....[1]

(iii) State the least attractive surface for attracting coral recruits.

.....[1]

(iv) Suggest the purpose of the mined control.

.....

.....[1]

8 **(a)** State **two** characteristics that all molluscs have.

1 .....

2 .....[2]

(b) Fig. 8.1 shows five members of the phylum *mollusca*.

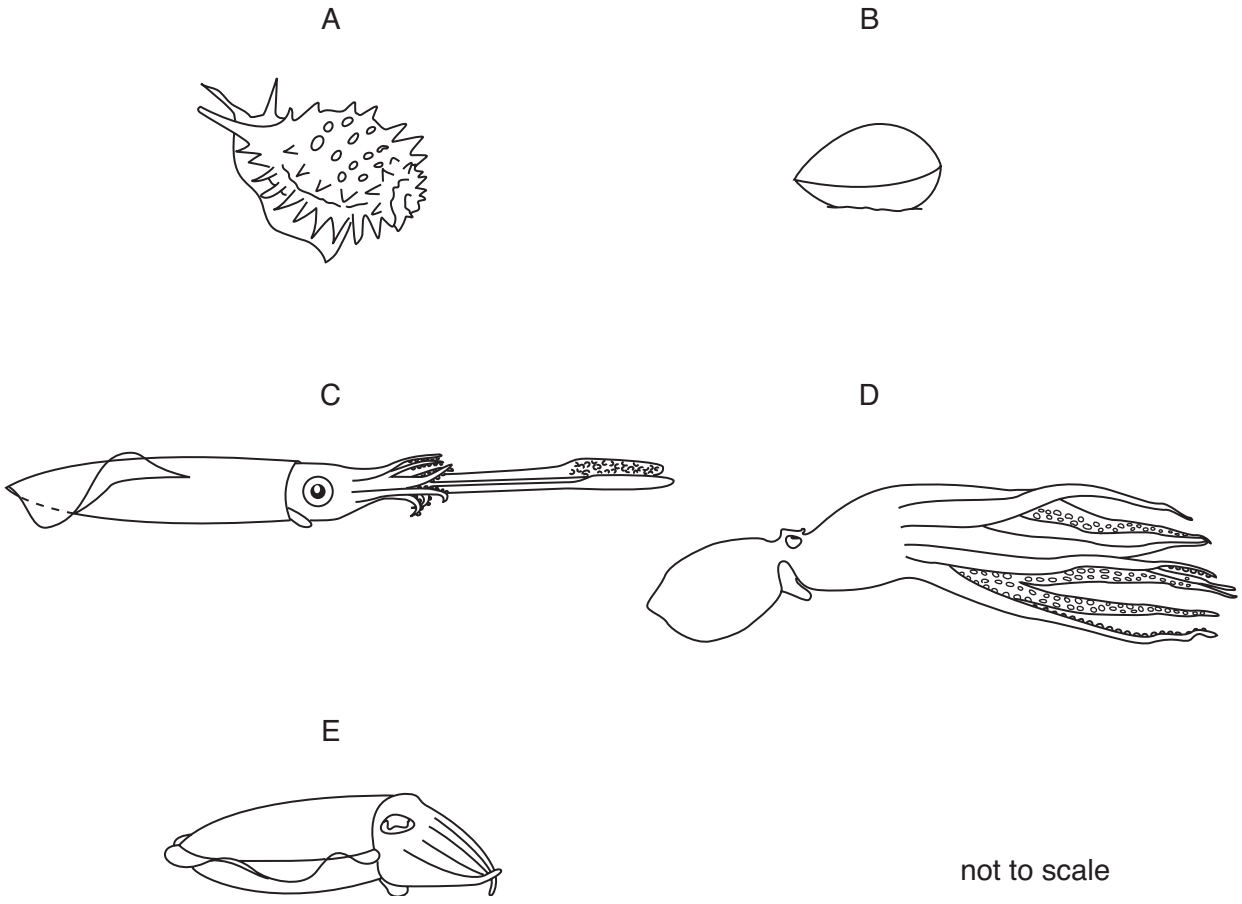


Fig. 8.1

Use the key below to identify the molluscs A, B, C, D and E shown in Fig. 8.1. Write the appropriate letter for each organism identified in the correct box in the key.

Key for identifying molluscs

1a internal shell present	go to 2
1b external shell present	go to 4
2a has eight arms	
2b does not have eight arms	go to 3
3a has a thin transparent 'pen'	
3b has a thick transparent 'pen'	
4a has a hinged shell	
4b does not have a hinged shell	

[5]

(c) Complete Fig. 8.2 by using the organisms **nudibranch**, **octopus** and **giant clam** to give an example of each class of mollusc.

class	organism
cephalopoda	
bivalvia	
gastropoda	

[3]

Fig. 8.2

(d) Gastropods have a radula. Define what is meant by *radula* and state in which of the gastropod's activities it is used.

.....

.....

.....[2]

[Turn over

9 **(a)** Fig. 9.1 illustrates the variation of water density with depth in 35 parts per thousand salinity sea water.

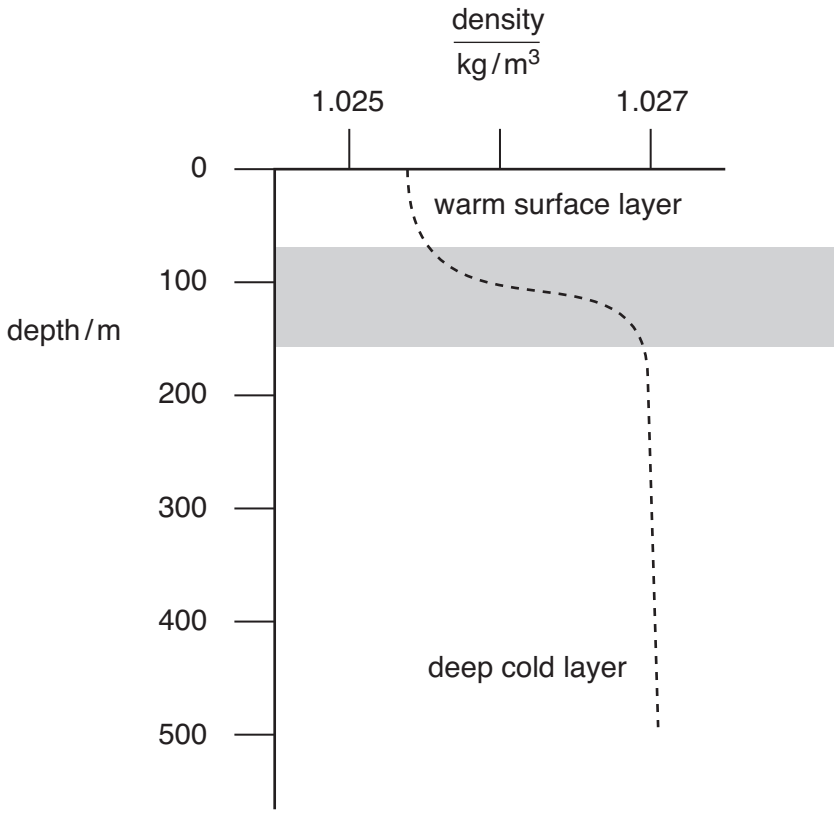


Fig. 9.1

(i) State the name for the shaded band in Fig. 9.1.

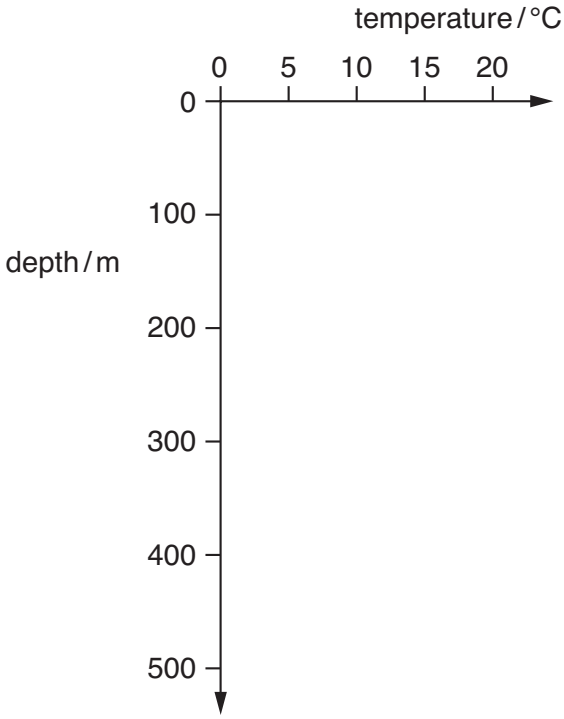
.....[1]

(ii) State **two** conditions which change very rapidly within the band drawn in Fig. 9.1.

1 .....

2 .....[2]

(b) Using the axes of Fig. 9.2, draw a graph for the vertical distribution of water temperature in 35 parts per thousand sea water.



[2]

Fig. 9.2

(c) Explain why most marine plants are found in the surface layers of oceans and seas.

.....

.....

.....[2]

[Turn over

10 (a) List **two** examples, from the Maldivian fishing industry, of each of the following.

(i) food products

1 .....

2 .....[2]

(ii) food by-products

1 .....

2 .....[2]

(iii) non-food by-products

1 .....

2 .....[2]

(b) One food product is produced from fish by-catch species. Explain what is meant by the term *by-catch*.

.....

.....[2]

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