

Centre Number	Candidate Number	Name
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UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
General Certificate of Education Ordinary Level

FISHERIES SCIENCE

5151/01

Paper 1

October/November 2004

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.

FOR EXAMINER'S USE	
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TOTAL	

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.

This document consists of **16** printed pages.



1 Tides occur in most seas.

(a) What is a *tide*?

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

(b) What causes tides?

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

(c) What is a *spring tide*?

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

(d) What is a *neap tide*?

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

2 When fish is frozen, heat is extracted, which lowers the temperature of the fish. Heat continues to be extracted until almost all the water is solidified.

(a) Fig. 2.1 shows the percentage of water frozen at different temperatures in fish muscle. Label the axes with suitable titles. [2]

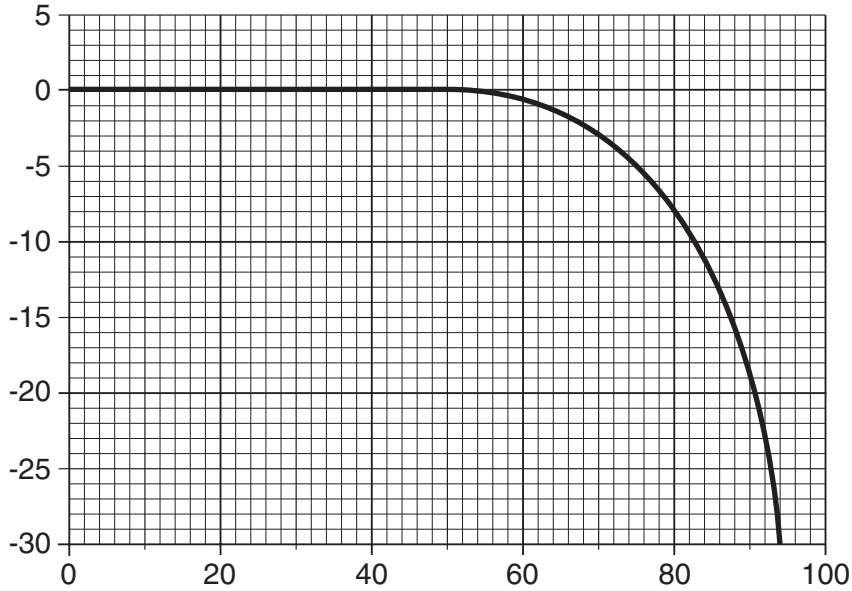


Fig. 2.1

(b) Estimate the percentage of water that is left unfrozen at -5°C .

.....[1]

(c) State why a temperature of -30°C is used to keep fish frozen.

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

(d) State one factor that lowers the temperature at which the water in fish begins to freeze.

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

(e) Suggest two changes that would occur in a fish if it were kept at a temperature higher than -30°C .

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

3 In the animal kingdom, all animals are placed in major groups (phyla). These phyla are subdivided into classes.

(a) Some of the major phyla and classes of the animal kingdom are given in Fig. 3.1. Write **one** of the words from the list below on each of the dotted lines to complete Fig. 3.1.

Cephalopoda, Platyhelminthes, Anthozoa, Protochordata, Crinoidea [4]

Phylum	Class
<i>Cnidaria</i>	<i>Hydrozoa</i> <i>Schyphozoa</i>
.....	<i>Turbellaria</i>
<i>Mollusca</i>	<i>Bivalvia</i> <i>Gastropoda</i> <i>Scaphopoda</i>
<i>Bryozoa</i>	(no classes)
<i>Echinodermata</i>	<i>Asteroidea</i> <i>Echinoidea</i> <i>Holothuroidea</i> <i>Ophiuroidea</i>
<i>Chordata</i> <i>Vertebrata</i>

Fig. 3.1

(b) The descriptions A – E below give the main features of five of the phyla of animals.

- A animals with a ventral heart and a notochord which becomes the spinal cord in higher species
- B animals with a soft unsegmented body, a head and muscular foot and most have a hard shell
- C aquatic animals that are usually sedentary and colonial and have ciliated tentacles
- D animals that are bilaterally symmetrical with one opening and a complex hermaphroditic reproductive system
- E radially symmetrical animals with a hollow sac-like body, a single opening, the mouth being surrounded by a ring of tentacles

Match each description to one of these phyla by placing the correct letter next to it.

- Cnidaria*
- Bryozoa*
- Platyhelminthes*
- Mollusca*
- Chordata*

[5]

(c) Animals are heterotrophs. State what is meant by the term *heterotroph*.

.....

.....[1]

4 Fig. 4.1 shows the zones of the reef area around an island.

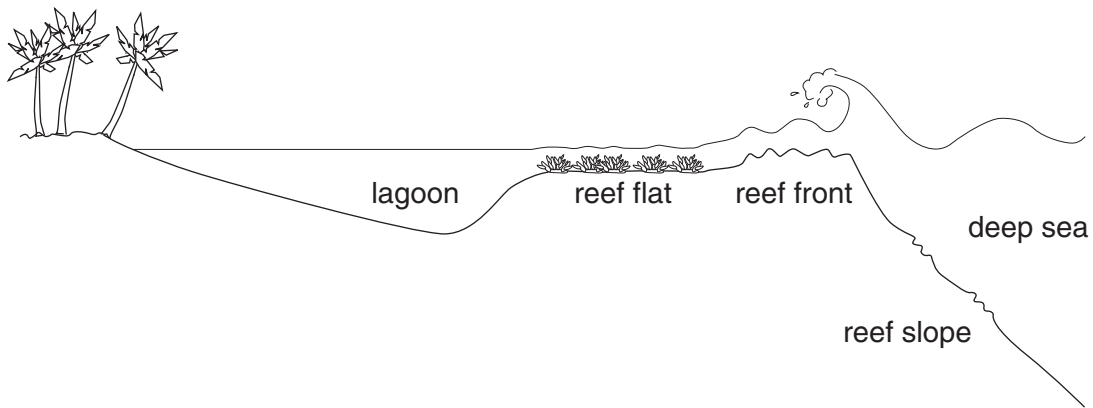


Fig. 4.1

(a) Give one difference between the reef flat and the reef slope.

.....
[1]

(b) Describe two of the environmental conditions that are found in the lagoon.

1.

 2.
[2]

(c) In the shallow water near the beach there is reduced water movement. State two effects that this causes.

1.

 2.
[2]

(d) State in which of the zones shown in Fig. 4.1 you would find each of the organisms named below. For each organism, give a reason for your choice of zone.

lion fish

zone

reason
.....

sea fans

zone

reason
.....

giant clam

zone

reason
.....

[6]

5 Fishing gear is of two types: active gear and passive gear.
The diagrams below show four types of active fishing gear.

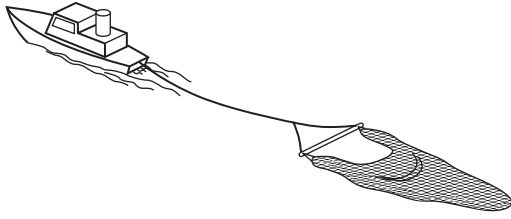


Fig. 5.1

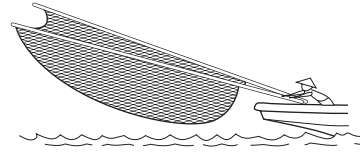


Fig. 5.2

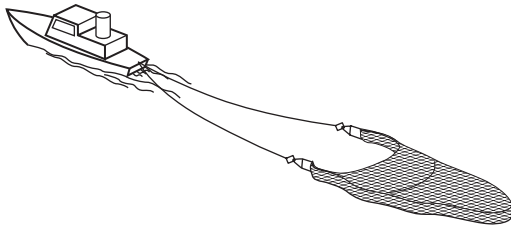


Fig. 5.3

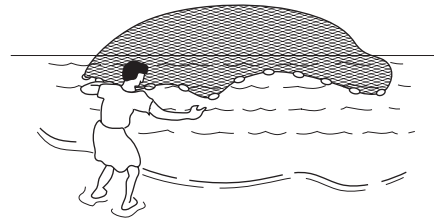


Fig. 5.4

(a) Give the name of the type of gear in each diagram.

type of gear in Fig. 5.1

type of gear in Fig. 5.2

type of gear in Fig. 5.3

type of gear in Fig. 5.4[4]

(b) Suggest a type of fish that could be caught using the gear in Fig. 5.1.

.....[1]

(c) Describe how the gear in Fig. 5.2 is used to capture live bait.

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

(d) State the reason why the gear in Fig. 5.4 is usually used in shallow water.

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

- 6 Sea cucumber (beche-de-mer) are exported from the Maldives.
Fig. 6.1 shows the average export price in rufiyaa per kg of sea cucumbers.

Year	<u>Average price</u> Rf / kg
1986	71.09
1987	91.94
1988	71.38
1989	38.45
1990	42.34
1991	50.67
1992	70.66
1993	90.63
1994	76.00

Fig. 6.1

- (a) Which year had the highest average export price per kg?

.....[1]

- (b) (i) Which year had the lowest average export price per kg?

.....[1]

- (ii) Suggest one possible reason why the price was so low in this year.

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

(c) Suggest one reason why SCUBA diving for sea cucumber is prohibited by law in the Maldives.

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

(d) Fig. 6.2 shows the relative abundance of commercially important sea cucumber species in the sea surrounding various islands in the Maldives.

species	island														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
<i>T. ananas</i>	-	--	-	--	-	-	--	--	--	-	--	--	--	--	--
<i>M. nobilis</i>	+	-	-	--	-	-	-	-	--	--	-	-	--	--	--
<i>A. mauritiana</i>	+	-	--	+	-	-	-	+	+	-	+	+	-	+	+
<i>S. chloronotus</i>	++	++	+	+	++	+	+	++	+	++	++	+	+	+	+
<i>B. marmorata</i>	+	-	+	+	+	+	-	-	-	+	+	+	-	+	-
<i>H. atra</i>	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++
<i>M. axiologa</i>	++	+	+	+	++	+	-	-	-	-	-	+	+	+	-
<i>T. anax</i>	+	+	+	++	+	+	+	-	-	+	-	+	+	+	-

Key: ++ very common
+ common
- rare
-- very rare

Fig. 6.2

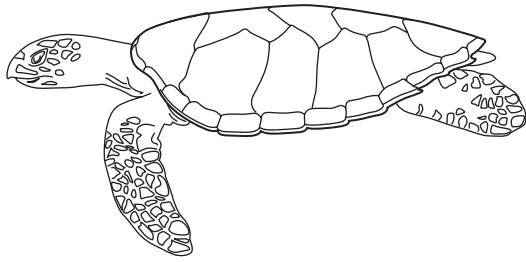
(i) Name the most common species of sea cucumber in Fig. 6.2.
.....[1]

(ii) Name the rarest species of sea cucumber in Fig. 6.2.
.....[1]

(e) Suggest one way in which sea cucumber populations could be protected from further exploitation.
.....
.....[1]

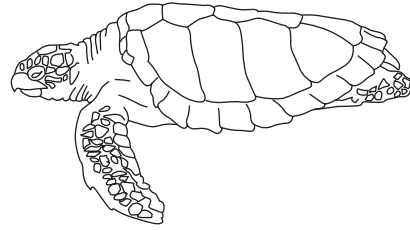
7 Five species of turtle can be found in the Maldives. These are the green, hawksbill, leatherback, loggerhead and Oliver Ridley turtles. All of these are endangered species.

(a) Look at Figs. 7.1 to 7.5 and give the name of each species of turtle. [5]



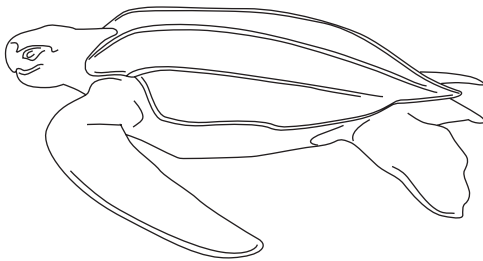
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Fig. 7.1



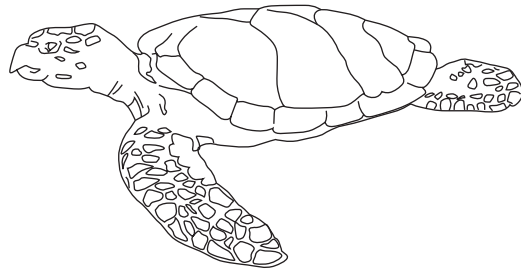
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Fig. 7.2



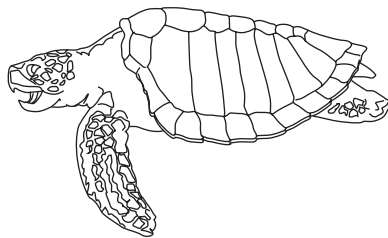
.....

Fig. 7.3



.....

Fig. 7.4



.....

Fig. 7.5

(b) State what is meant by the term *endangered species*.

.....

.....[1]

(c) Why has the taking of all species of turtle been banned for ten years from 1995?

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

(d) State one reason for having islands as sanctuaries for turtles.

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

(e) Suggest one way to protect the turtle population for the future.

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

(f) List two endangered species, other than turtles, found in the seas around the Maldives.

1.
2.[2]

8 Fig. 8.1 gives the percentages of fish caught in the Maldives in 1984.

type of fish	percentage of catch
skipjack tuna	58
yellowfin tuna	13
other tuna species	9
non-tuna species	
total catch	100

Fig. 8.1

(a) Complete Fig. 8.1 by writing in the percentage of the catch that was non-tuna species. [1]

(b) In 1984 the total fish catch was 55 000 tonnes. Calculate the mass of skipjack tuna caught in 1984. Show your working.

mass = [3]

(c) Using the data in Fig. 8.1, label the key for the pie chart in Fig. 8.2. [4]

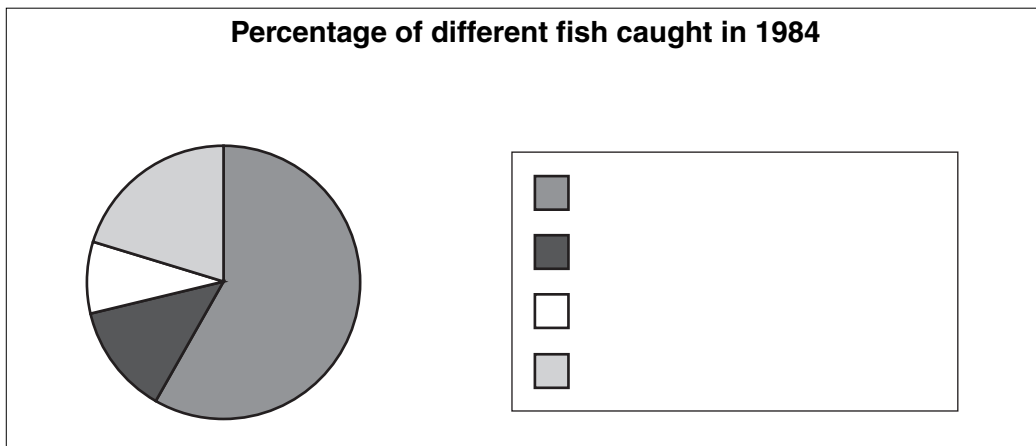


Fig. 8.2

(d) Name two species of tuna, other than skipjack or yellowfin, that are caught in the Maldives.

1.
2. [2]

- 9 Read the passage about yellowfin tuna and use information from it to answer the questions below.

The yellowfin tuna (*Thunnus albacares*) was first identified in 1788. It is a large species, the body being deepest near the middle of the first dorsal fin. Some large specimens have very long dorsal and anal fins which can be 20% of the fork length. The smallest mature fish caught have a fork length of 50-60 cm. The maximum fork length found is over 200 cm.

Yellowfin tuna are epipelagic, being found both above and below the thermocline. Unlike some species of tuna, they have a swim bladder. They often form schools in near-surface waters. Sometimes they school with other species, for example porpoises.

There are important yellowfin tuna fisheries in all the tropical and sub-tropical seas. Near-surface schooling yellowfin tuna are caught mainly by pole and line fishing or purse seining. In some areas they are caught by trolling. Deep water tuna are caught by long lining. This type of fishing is carried out mainly by fishing boats from Japan and Korea. Catches have stabilised in recent years. The FAO reported a total catch of 1,258,386 tonnes in 1999. The countries with the largest catches were Indonesia and Mexico. These countries catch surface living tuna by purse seining.

- (a) Do yellowfin tuna have a swimbladder?
.....[1]
- (b) In which year was yellowfin tuna first identified?
.....[1]
- (c) Which are the two countries with the largest catch of this species?
.....
.....[2]
- (d) What is the fork length of the smallest mature fish caught?
.....[1]
- (e) What was the total catch reported to FAO in 1999 for this species?
.....[1]

10 Fins help a fish to control its movement through the water. Some fins are single fins in the midline of the fish, others are paired.

(a) Name the paired fins found on a fish.

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

(b) Name the fins that control

(i) yawing,

.....

(ii) pitching,

.....

(iii) rolling.

.....[3]

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