Cambridge Assessment International Education

Cambridge International AS & A Level

CANDIDATE NAME									
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0123456789

MARINE SCIENCE **9693/01**

Paper 1 AS Level Theory **For examination from 2022**

SPECIMEN PAPER **1 hour 45 minutes**

You must answer on the question paper.

No additional materials are needed.

INSTRUCTIONS

- Answer **all** questions.
- Use a black or dark blue pen. You may use an HB pencil for any diagrams or graphs.
- Write your name, centre number and candidate number in the boxes at the top of the page.
- Write your answer to each question in the space provided.
- Do **not** use an erasable pen or correction fluid.
- Do **not** write on any bar codes.
- You may use a calculator.
- You should show all your working and use appropriate units.

INFORMATION

- The total mark for this paper is 75.
- The number of marks for each question or part question is shown in brackets [ ].

This document has **16** pages. Blank pages are indicated.

Section A

Answer **all** questions in this section.

1 (a) The list shows some features of cartilaginous fish and bony fish.

gill slits caudal fin gills scales swim bladder

dorsal fin denticles externally visible lateral line

Write each feature in the correct position in Fig. 1.1, to show which features are present in cartilaginous fish only, which are present in bony fish only, and which are present in both.

Write each feature only once.

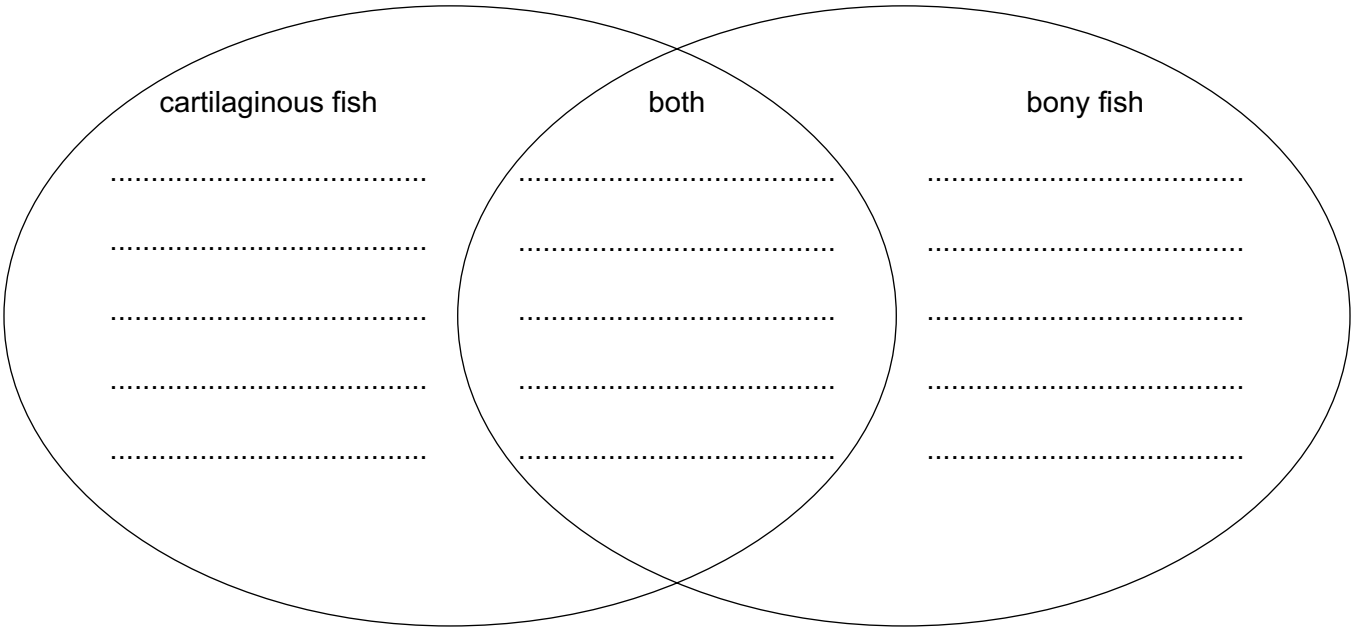

Fig.1.1

[3]

(b) Fig. 1.2 shows a blue shark, *Prionace glauca*.

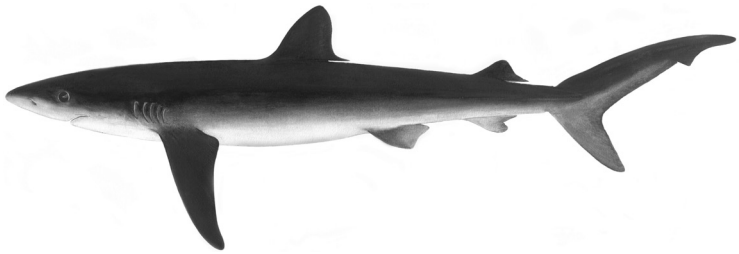

Fig. 1.2

(i) Label the anal fin on Fig. 1.2 . [1]

(ii) Table 1.1 shows the classification of the blue shark.

Complete the four spaces on the table to show how this species is classified.

Table 1.1

domain	Eukarya
kingdom	Animalia
phylum	Chordata
.....	Chondrichthyes
order	Carcharhiniformes
.....	Carcharhinidae
genus	.....
species	.....

[2]

(iii) Blue sharks are an epipelagic species.

Explain the meaning of epipelagic.

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..... [1]

(c) Fig. 1.3 shows a food chain for the blue shark.

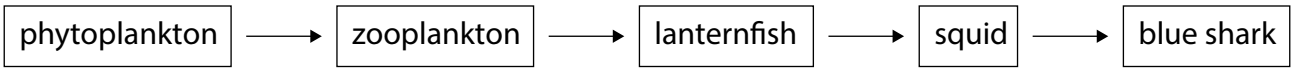

Fig.1.3

(i) State the trophic level of the blue shark in this food chain.

..... [1]

(ii) Blue sharks also feed on pelagic red crabs, which feed on phytoplankton.

Add this information to Fig. 1.3. [2]

(iii) Explain which food chain allows a greater percentage of the energy captured by the primary producers to reach the blue shark.

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..... [2]

[Total: 12]

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2 Table 2.1 shows a section of a tide table for a sandy shore on 15 July.

There was a full moon on 15 July.

Table 2.1

15 July	
time	**height / m**
00:53	0.26 m
07:45	4.09 m
13:11	0.42 m
20:03	4.34 m

(a) (i) Tidal range is defined as the difference between a high tide and the following low tide.

Use Table 2.1 to calculate the tidal range at this shore on 15 July.

..... m [1]

(ii) State **two** reasons why the actual tidal range at this location on 15 July could be greater than the predicted range.

1 .....

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2 .....

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[2]

(b) The maximum tidal range at the same shore on 22 July was 2.47 m less than on 15 July.

There was a quarter moon on 22 July.

Explain the reason for the difference in tidal range at this location, on these two dates.

You may use annotated diagrams in your answer.

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[4]

[Total: 7]

3 Sea water consists of many different elements and compounds.

(a) Fig. 3.1 shows sodium ions and chloride ions in part of a sodium chloride crystal.

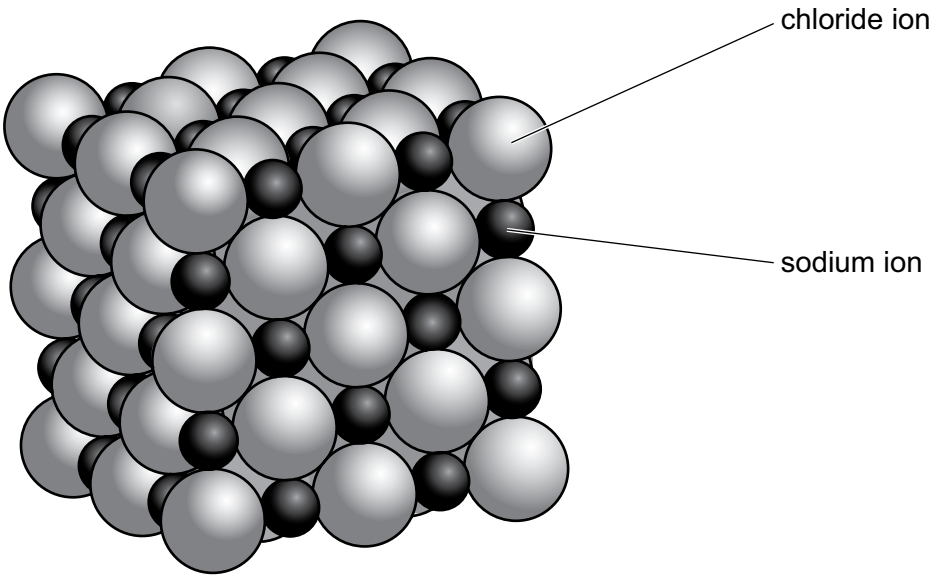

Fig. 3.1

Explain how this ionic structure forms from sodium atoms and chlorine atoms.

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..... [4]

(b) Draw **one** molecule of water to show the electron sharing present between the atoms.

[2]

(c) Describe how sodium chloride dissolves in water.

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..... [2]

(d) Table 3.1 shows how salinity varies with depth in an estuary.

Table 3.1

depth / m	salinity / parts per thousand
2	20.98
4	22.28
6	23.08
8	27.71
10	29.14
12	30.08

(i) State **and** explain the relationship between depth and salinity in this estuary.

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..... [2]

(ii) A fish may swim throughout the water column in this estuary.

Explain how changes in abiotic factors from increasing depth could affect the availability of oxygen for the fish.

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..... [2]

[Total: 12]

4 The productivity of producers is dependent on many factors.

(a) Define productivity.

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..... [2]

(b) Table 4.1 shows the mean primary productivity, per m^2 per year, and the total primary productivity per year in different regions of the world oceans.

Table 4.1

region	area / 10^6 km^2	mean primary productivity / g per m^2 per year	total primary productivity / 10^9 tonnes per year
tropical and subtropical oceans	190.0	55	10.45
temperate and subpolar	100.0	206	20.60
polar	52.0	27	1.40
continental shelf (no upwelling)	26.6	290	7.71
continental shelf (upwelling)	0.4	1050	0.42
coral reef	0.1	1410	0.14

(i) State which region has the lowest mean primary productivity and suggest a reason for this.

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..... [2]

(ii) Explain why coral reefs are the region with the highest mean primary productivity.

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..... [3]

(iii) Explain why continental shelf regions with no upwelling have a higher total primary productivity than continental shelf areas with upwelling.

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..... [1]

(c) Some upwelling areas, such as the Benguela upwelling on the west coast of Africa, have the benefits of upwelling all year round.

(i) Explain how upwelling occurs.

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..... [3]

(ii) Suggest the benefits to the local fisheries of year-round upwelling.

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[Total: 14]

Section B

Answer **all** questions in this section.

5 **(a)** Weathering and erosion affect the type and morphology of shorelines that develop in the littoral zone.

Explain how erosion can affect the morphology of the different types of shore. In your answer include reference to the **four** main types of erosion.

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(b) Describe the features of a sandy shore ecosystem **and** outline how the organisms that live there are adapted to cope with the abiotic factors in this environment.

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(c) Mangrove forests develop in the littoral zone of some tropical and subtropical coasts.

Explain how the red mangrove, *Rhizophora mangle*, is adapted to this environment.

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.....[5]

[Total: 20]

6 **(a)** Water is an unusual substance because its solid form, ice, floats on its liquid form.

Explain the importance of this to marine life.

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(b) Using examples, discuss the importance of maintaining **global** marine biodiversity in terms of the services it provides.

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[Total: 10]

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