Cambridge Assessment International Education

Cambridge International AS & A Level

CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER				

4285897575

MARINE SCIENCE **9693/11**

Paper 1 AS Level Theory **October/November 2022**

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 **12** pages.

Section A

Answer **all** questions in this section.

1 **(a)** Many large molecules are made from small molecules.

Complete Table 1.1.

Table 1.1

small molecules	large molecule	main chemical elements in the molecule
.....	cellulose	....
.....	protein	carbon, hydrogen, oxygen, nitrogen, sulfur
fatty acids and glycerol	.....	....

[5]

(b) Fig. 1.1 shows part of the carbon cycle in the ocean.

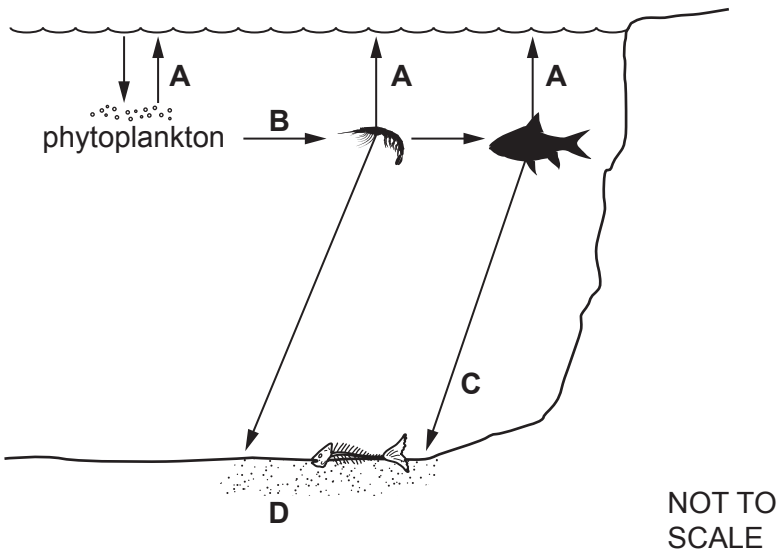

Fig. 1.1

(i) Give the name of the processes **A**, **B** and **C**.

A .....

B .....

C .....

[3]

(ii) At **D**, over millions of years, fossil fuels may form.

Describe how carbon in fossil fuels may be returned to the atmosphere.

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.....

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..... [3]

(iii) At **D**, over millions of years, rocks may form.

Describe how these rocks form.

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..... [2]

[Total: 13]

2 **(a)** Table 2.1 shows part of the classification of the leatherback turtle.

All turtles are in the same phylum as bony fish.

Table 2.1

group	leatherback turtle classification
domain	.....
kingdom	.....
phylum	.....
class	Reptilia
order	Testudines
family	Dermochelyidae
genus	*Dermochelys*
species	*coriacea*

(i) Complete Table 2.1 to give the domain, kingdom and phylum of the leatherback turtle. [3]

(ii) Give the binomial name of the leatherback turtle.

..... [1]

(b) Fig. 2.1 shows a leatherback turtle with attached remora fish.

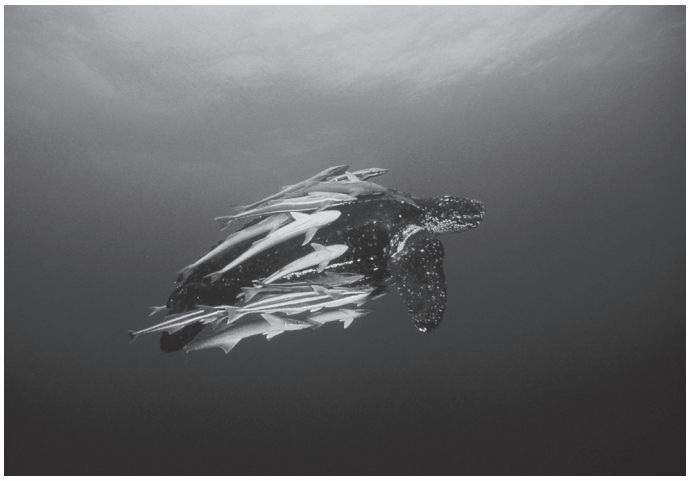

Fig. 2.1

(i) Remora fish have a commensal relationship with leatherback turtles.

Define the term commensal.

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..... [2]

(ii) Scientists have investigated the effect of remora fish on the swimming efficiency of turtles.

Suggest how the presence of remora fish may be a disadvantage to a turtle when the turtle is swimming.

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.....

..... [3]

[Total: 9]

3 **(a)** Describe the differences between liquid water and ice in terms of the arrangement and the movement of water molecules.

1 .....

.....

2 .....

.....

[2]

(b) Fig. 3.1 shows the arrangement of an oxygen atom and hydrogen atoms in a water molecule.

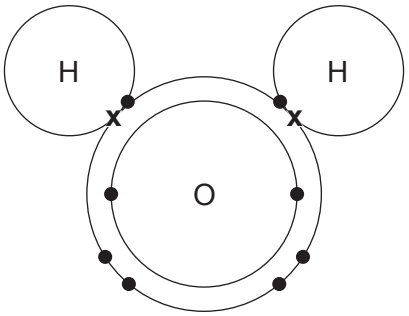

Fig. 3.1

(i) What is represented by the crosses (**x**) in Fig. 3.1?

..... [1]

(ii) Name the type of bond between oxygen and hydrogen in the water molecule shown in Fig. 3.1.

..... [1]

(iii) Describe how a bond forms between two water molecules.

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..... [4]

(iv) Explain how the bonds between water molecules affect the density of liquid water and of ice.

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..... [3]

(v) Describe **one** way that the relative density of liquid water and of ice affects marine organisms.

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..... [1]

(vi) State **three** factors that affect the density of sea water.

1 .....

2 .....

3 .....

[3]

[Total: 15]

4 **(a)** A chimney with a height of 60 m above the ocean floor has been discovered at a hydrothermal vent.

The ocean depth from the surface to the ocean floor is 800 m at this point.

Calculate the height of the chimney as a percentage of the ocean depth.

Show your working.

.....%
[2]

(b) Table. 4.1 shows the productivity at two hydrothermal vents.

Table 4.1

vent	total productivity / g carbon year^{-1}
A	4.7×10^6
B	7.4×10^3

(i) Calculate how many times greater the productivity is at vent **A** compared with vent **B**.

Show your working.

Give your answer to an appropriate number of significant figures.

.....
[3]

(ii) Suggest **one** reason for the lower productivity at vent **B**.

.....

..... [1]

(iii) Productivity at hydrothermal vents affects the total biomass of the food web in the ocean around the vent.

A student predicted vent **A** would increase the biomass in a larger volume of ocean than vent **B**.

Explain why vent **A** may increase the biomass in a larger volume than vent **B**.

.....

.....

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..... [2]

[Total: 8]

Section B

Answer **all** questions in this section.

5 **(a)** Explain the effect of increasing ocean temperature on the solubility of salts and gases.

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..... [5]

(b) Describe the impact of decreasing concentrations of oxygen and carbon dioxide on marine organisms.

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..... [7]

[Total: 12]

6 (a) (i) Biodiversity can be considered at three different levels.

Describe the three different levels of biodiversity **and** explain why all three levels should be considered.

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..... [7]

(ii) Explain, with examples, how coral reefs contribute to stable abiotic factors in the environment.

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..... [6]

(b) Describe the importance of mangrove forests to human communities.

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..... [5]

[Total: 18]