Cambridge International AS & A Level

CANDIDATE NAME	

CENTRE NUMBER						CANDIDATE NUMBER				

MARINE SCIENCE **9693/01**

Paper 1 AS Structured Questions **October/November 2017**

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.
You may use an HB pencil for any diagrams or graphs.
Do not use staples, paper clips, glue or correction fluid.
DO **NOT** WRITE IN ANY BARCODES.

Answer **all** questions.
Write your answers in the spaces provided on the Question Paper.

Electronic calculators may be used.
You may lose marks if you do not show your working or if you do not use appropriate units.

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.

CAMBRIDGE
International Examinations

[Turn over

Answer **all** the questions in the spaces provided.

1 **(a)** Fig. 1.1 shows the location of the Philippines.

Fig. 1.1

Fig. 1.2 shows the mean number of tropical cyclones per month in the Philippines between 1948 and 2010. It also shows the number of tropical cyclones that made landfall and the number that did not make landfall.

Fig. 1.2

(i) State the **two** months in which the difference between the mean number of tropical cyclones that made landfall and the mean number that did not make landfall was the least.

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

(ii) Compare the mean number of tropical cyclones that made landfall and the mean number that did not make landfall.

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....[3]

(iii) Fig. 1.3 shows the monthly temperature of the sea in the area where the tropical cyclones develop.

Fig. 1.3

Suggest why the total number of tropical cyclones in July and August was higher than the total number of tropical cyclones in January and February.

....

....[1]

(b) (i) Suggest **two** harmful effects of a tropical cyclone on a country.

1 ....

....

2 ....

....
[2]

(ii) Suggest **two** beneficial effects of a tropical cyclone on a country.

1 ....

....

2 ....

....
[2]

(c) Suggest why the wind speed falls as a tropical cyclone makes landfall.

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....[2]

[Total: 11]

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2 (a) Explain what is meant by the term *productivity*.

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....[3]

(b) Fig. 2.1 shows the changes in sunlight, nutrients, phytoplankton and zooplankton in the North Atlantic Ocean over a 12 month period.

Fig. 2.1

(i) Describe the change in the number of phytoplankton between April and October.

....

....[1]

(ii) With reference to Fig. 2.1, describe **and** explain the relationship between the number of phytoplankton and the level of sunlight in the period January to April.

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....[3]

(iii) With reference to Fig. 2.1, describe **and** explain the trend shown in the concentration of nutrients in the period January to April.

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....[3]

(iv) Sketch a line on Fig. 2.1, to show how the level of productivity changes between the months of January and June. [2]

(v) Explain how these data in Fig. 2.1 support the idea that the zooplankton feed on the phytoplankton.

....

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....

....

....[3]

[Total: 15]

3 **(a)** Fig. 3.1 shows four stages in the formation of an atoll.

stage **1**

stage **2**

stage **3**

stage **4**

A
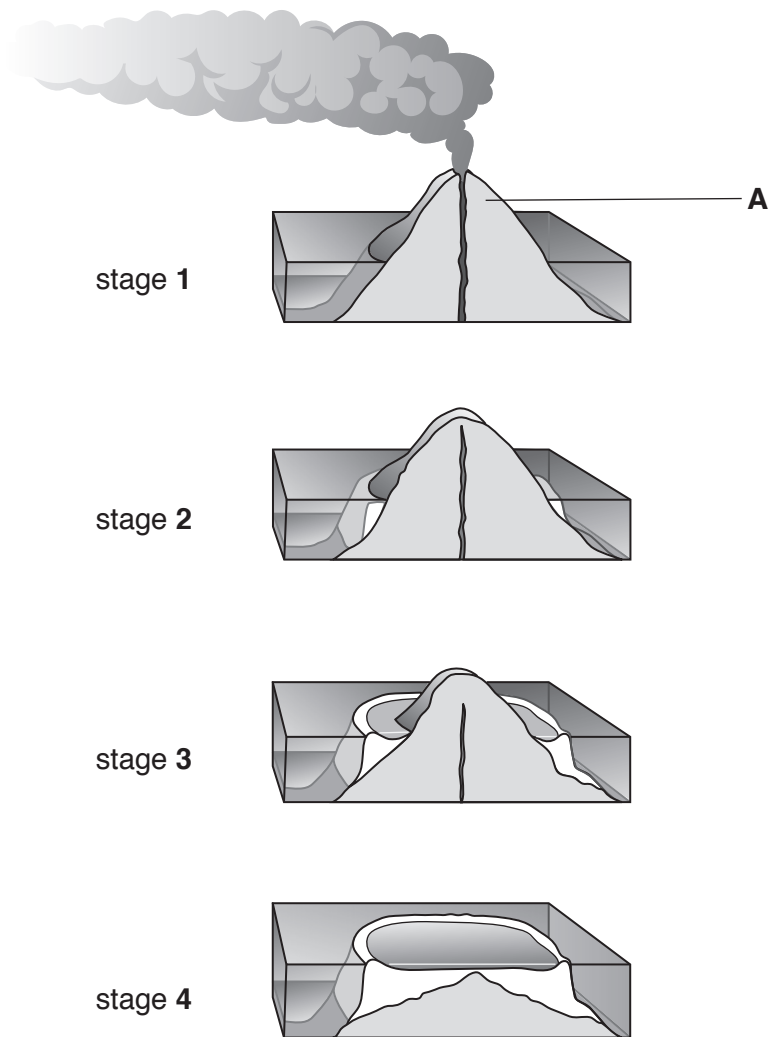
Fig. 3.1

(i) Name the part labelled **A**.

....[1]

(ii) Describe the processes taking place from stage **2** to stage **4**.

....

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....

....

....

....

....

....

....[4]

(b) State **two** factors that lead to the erosion of coral reefs.

1 ....

2 ....

[2]

(c) The age of coral can be estimated using carbon dating. This method can be used to date a sample of coral to within an accuracy of 100 years.

The atmosphere contains a very small quantity of radioactive carbon (^{14}C), which is absorbed into living organisms. Over time, this changes to ^{12}C.

Fig. 3.2 shows the relationship between the percentage of ^{14}C that is left in a once-living material and the age of the material.
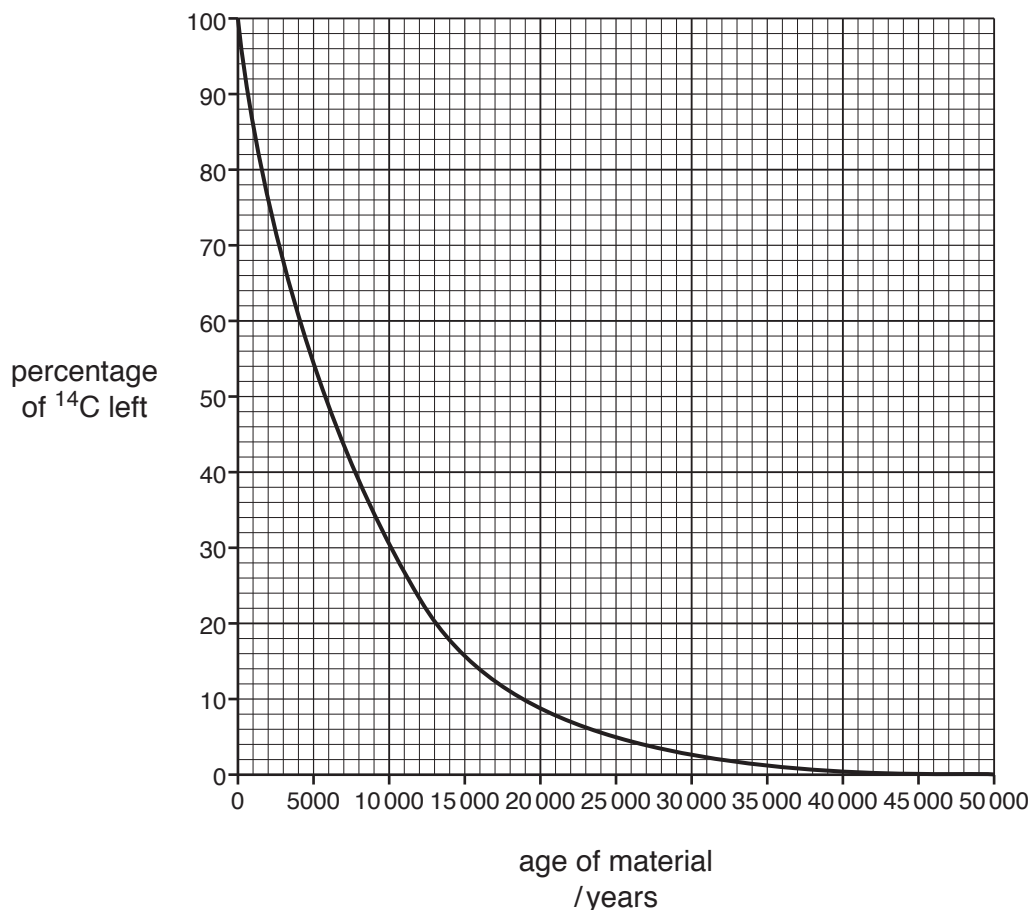
Fig. 3.2

(i) Describe the relationship between the age of a material and the percentage of ^{14}C in the material.

....

....[1]

(ii) State the age of a material which contains 30% ^{14}C.
Show on Fig. 3.2 how you decided on this value.

....

[2]

(iii) The half-life of a substance is the time taken for the amount of a radioactive substance to decrease by half.

Use Fig. 3.2 to determine the half-life of ^{14}C.

....
[1]

(iv) Coral aged more than 35 000 years old cannot be dated accurately.

With reference to Fig. 3.2, suggest a reason for this.

....

....[1]

[Total: 12]

4 **(a)** Fig. 4.1 shows part of a marine food web.
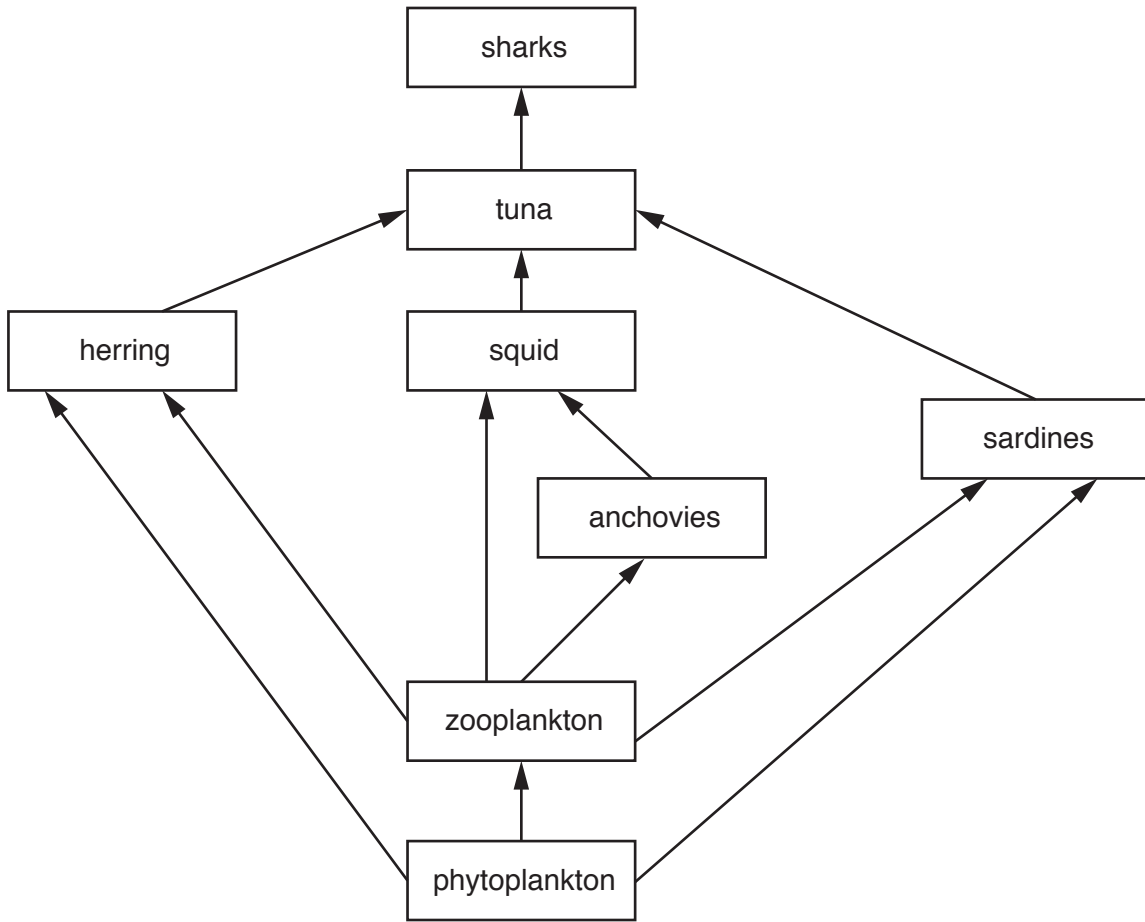
Fig. 4.1

(i) Complete Table 4.1 by placing a tick (✓) or ticks in each row to indicate if each organism is a predator, a primary consumer, a secondary consumer or a prey organism.

Table 4.1

organism	predator	primary consumer	secondary consumer	prey organism
tuna				
zooplankton				
squid				
sardines				

[4]

(ii) Name **two** organisms at the third trophic level in this food web.

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

(b) Fig. 4.2 shows a shoal of sardines.

Fig. 4.2

Explain the advantages to the sardines of shoaling behaviour.

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....[3]

(c) *Anisakis* is a genus of nematode. It is a common parasite of fish.

Fig. 4.3 shows the mean length of *Anisakis* larvae in fish of different ages.

mean
length of larvae
/ mm

age of fish
/ years

Fig. 4.3

(i) Explain the meaning of the term parasite.

....

....

....

....

....

....[3]

(ii) State the mean length of larvae found in fish aged 5 years.

....mm
[1]

(iii) State the relationship between the age of fish and the mean length of larvae.

....

....[1]

[Total: 13]

5 (a) Seawater contains many dissolved nutrients that are used by marine organisms.

Complete Table 5.1 by naming a nutrient for each biological use.

Table 5.1

biological use	nutrient
to make proteins	
to make chlorophyll	
to make shells	

[3]

(b) Explain how runoff from the land affects the chemical composition of seawater.

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....[4]

(c) Nutrients in the surface layers of oceans are replaced by upwellings.

Explain how changes in temperature result in upwellings.

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....

....[4]

[Total: 11]

6 (a) State **three** pieces of evidence which support the theory of plate tectonics.

1 ....

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2 ....

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3 ....

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[3]

(b) Fig. 6.1 shows a hydrothermal vent.
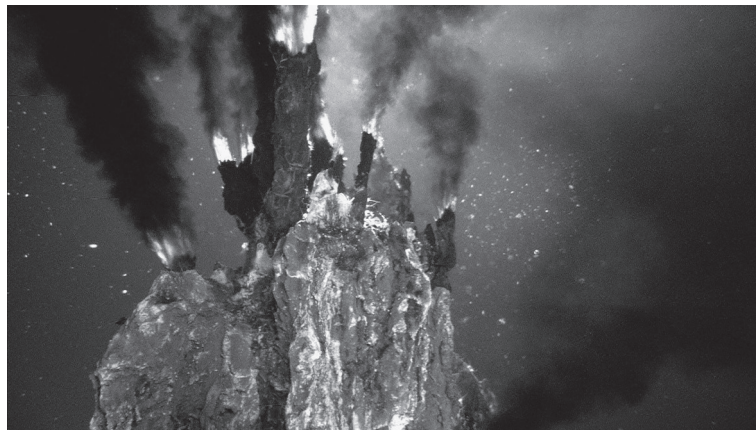
Fig. 6.1

(i) Explain how hydrothermal vents are formed.

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....[4]

(ii) Suggest how conditions at a hydrothermal vent make it impossible for plants to grow.

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....[3]

(iii) Hydrothermal vents sustain many food chains.

Describe the process that is used by organisms found at hydrothermal vents to provide energy for these food chains.

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.... [3]

[Total: 13]

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20

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