Cambridge International AS & A Level

Cambridge International Examinations
Cambridge International Advanced Subsidiary and Advanced Level

CANDIDATE NAME

CENTRE NUMBER | | | | | |

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0914110310

MARINE SCIENCE **9693/01**

Paper 1 AS Structured Questions **October/November 2018**

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.

This document consists of **17** printed pages and **3** blank pages.

CAMBRIDGE International Examinations

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

1 **(a)** Describe the conditions necessary for a tropical cyclone to develop and be maintained.

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..... [3]

(b) Fig. 1.1 shows how the wind speed changes with the distance from the centre of a tropical cyclone.

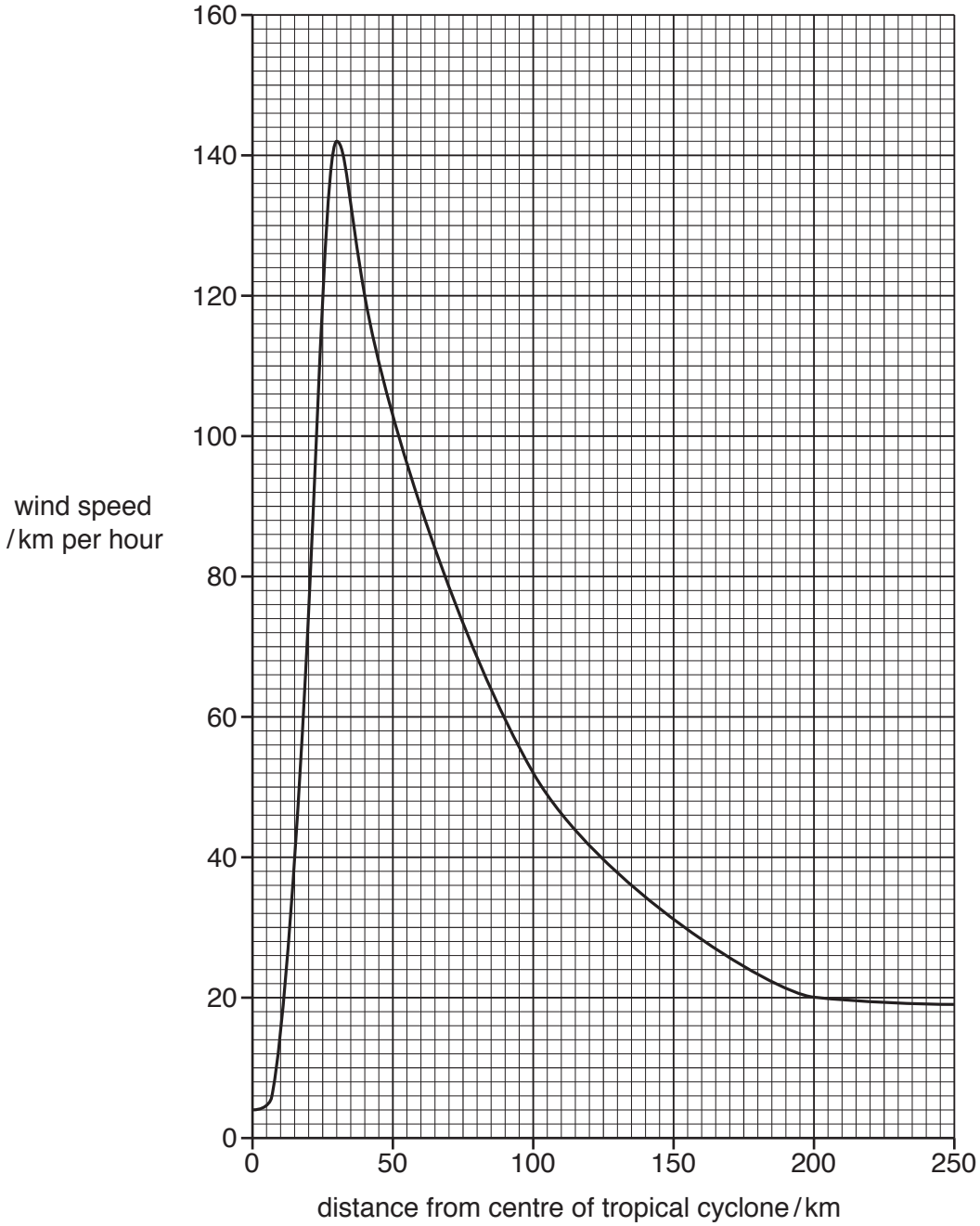

Fig. 1.1

Describe how the wind speed changes as the distance from the centre of the tropical cyclone increases.

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..... [3]

(c) Tropical cyclones can result in abnormal rises in sea level, known as storm surges.

Fig. 1.2 shows a storm surge.

Fig. 1.2

Suggest **three** negative effects a storm surge can have on a coastal community.

1 .....

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2 .....

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3 .....

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[3]

[Total: 9]

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2 An artificial reef is a man-made structure placed on the sea bed, designed to attract marine organisms to build up a reef structure.

(a) (i) Suggest how the use of artificial reefs helps to increase populations of marine organisms.

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..... [3]

(ii) In addition to attracting marine organisms, state **one** other advantage of using artificial reefs.

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..... [1]

(iii) Suggest **two** properties of materials that would be suitable for constructing an artificial reef.

1 .....

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2 .....

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[2]

(b) Fig. 2.1 shows some of the designs of modules used to construct artificial reefs.

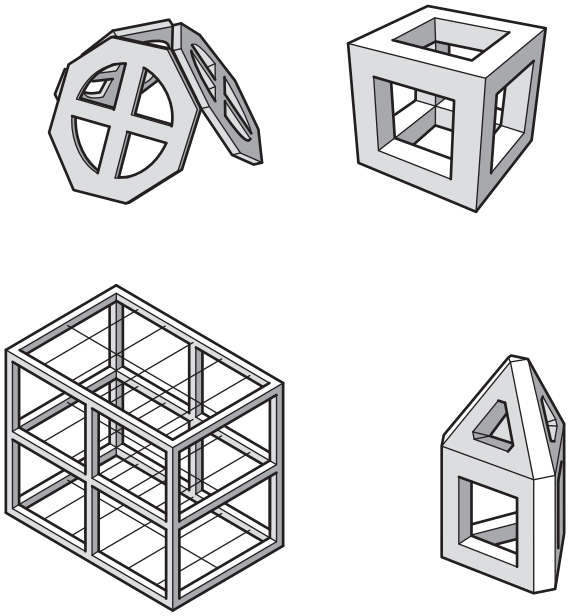

Fig. 2.1

(i) State **two** visible features these modules have in common.

1 .....

.....

2 .....

.....
[2]

(ii) Suggest reasons why a soft, sandy sea bed is an unsuitable site for an artificial reef.

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..... [2]

(iii) The artificial reef modules shown in Fig. 2.1 can be placed on the sea bed individually, or in groups.

Scientists investigated the effect of artificial reef size on the mean number of resident species after two months. The results are shown in Fig. 2.2.

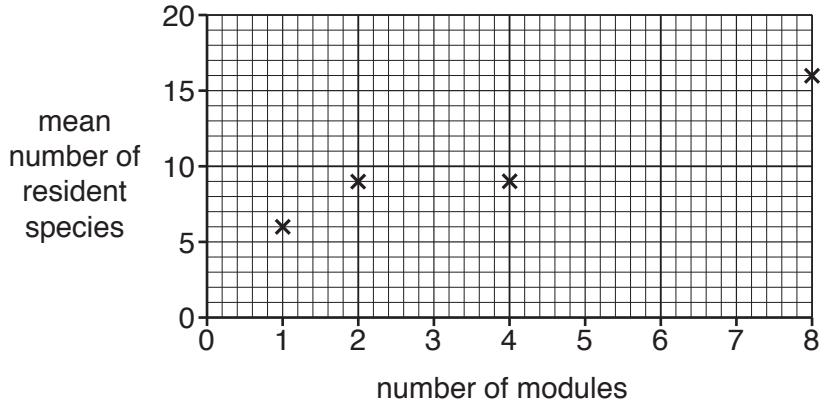

Fig. 2.2

Suggest reasons why doubling the size of the artificial reef from two to four modules has no impact on the mean number of resident species.

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..... [3]

[Total: 13]

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3 The list gives information about the feeding habits of some marine organisms.

- Large sharks feed on tuna.
- Small fish feed on zooplankton.
- Tuna feed on mackerel.
- Zooplankton feed on phytoplankton.
- Mackerel feed on small fish.

(a) Draw a food chain for these organisms.

[2]

(b) Some nematodes live in the body of tuna.

(i) Describe the relationship between nematodes and tuna.

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..... [3]

(ii) Scientists investigated the number and location of nematodes in 100 tuna. The results are shown in Table 3.1.

Table 3.1

location in tuna	percentage of tuna containing nematodes	range of number of nematodes found	mean number of nematodes found
abdominal cavity	10	0–42	8
stomach	80	0–5	3

Describe the distribution of nematodes in the tuna shown in Table 3.1.

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..... [2]

(iii) Suggest why large numbers of nematodes in the stomach may affect the biomass of the tuna.

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..... [1]

(c) Grouper and cleaner fish have a different type of interrelationship to tuna and nematodes.

State the name given to the interrelationship between grouper and cleaner fish.

..... [1]

[Total: 9]

4 **(a)** **(i)** Explain how the process of evaporation can change the salinity of sea water.

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..... [3]

(ii) Name **two** processes that can decrease the salinity of sea water.

1 .....

2 .....
[2]

(b) Sea water contains a large number of nutrients including carbon and magnesium.

(i) State **one** biological use for:

carbon .....

.....

magnesium .....

.....
[2]

(ii) State **one** way in which the amount of magnesium in the surface layer of the ocean is depleted.

.....

..... [1]

(iii) State **one** way in which the amount of magnesium in the surface layer of the ocean is replenished.

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..... [1]

(c) Sulfur is found in proteins. Like other nutrients, sulfur is cycled through every ecosystem.

Suggest how sulfur is cycled through a marine ecosystem. You may include a labelled diagram in your answer.

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..... [4]

[Total: 13]

5 Fig. 5.1 shows the dissolved oxygen concentration at different depths in the ocean.

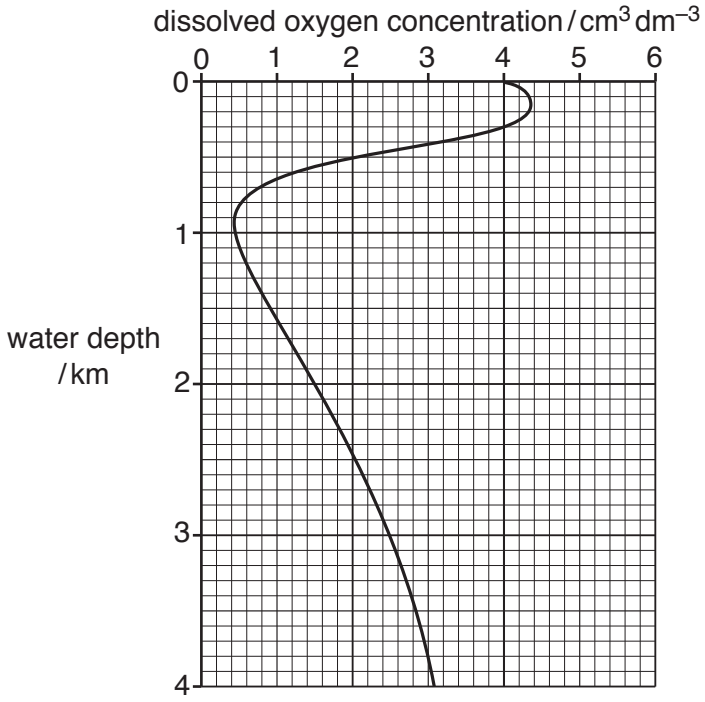

Fig. 5.1

(a) Calculate the overall percentage change in dissolved oxygen concentration between the surface and a depth of 1 km.

Show your working.

..... %
[2]

(b) Use the information in Fig. 5.1 to describe how dissolved oxygen concentration changes with depth.

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..... [3]

(c) Suggest why these changes in dissolved oxygen concentration occur.

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..... [4]

[Total: 9]

6 Fig. 6.1 shows the position of the Earth's major tectonic plates and tectonic plate boundaries.

The arrows show the direction of plate movement.

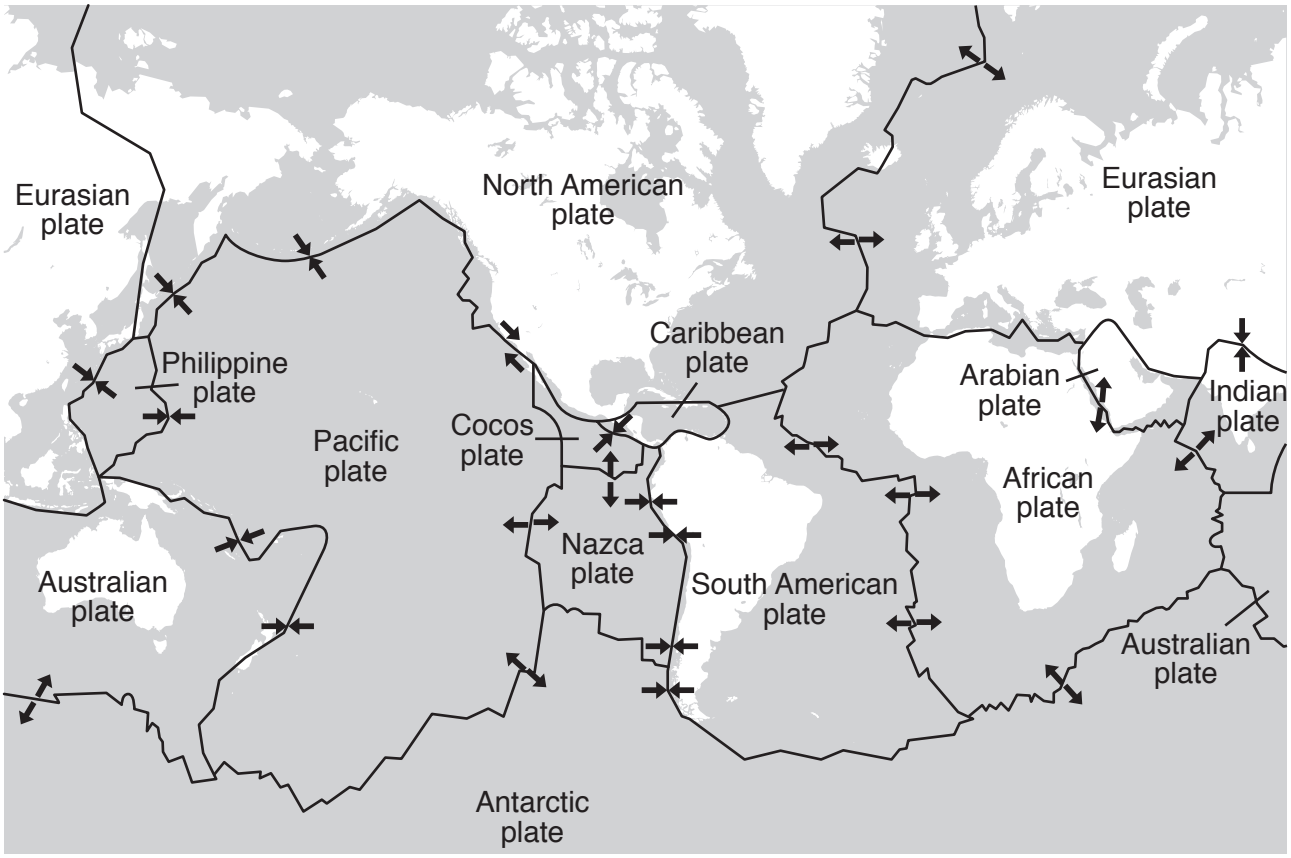

Fig. 6.1

(a) (i) With reference to Fig. 6.1, name the type of tectonic plate boundary:

between the Nazca plate and the South American plate.

.....

between the Indian plate and the African plate.

.....

[2]

(ii) With reference to Fig. 6.1, name the **two** plates between which there is a transform boundary.

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..... [1]

(b) (i) Describe how underwater earthquakes are caused by the movement of tectonic plates towards each other.

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..... [4]

(ii) Explain how an underwater earthquake can lead to the formation of a tsunami.

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..... [2]

[Total: 9]

7 **(a)** **(i)** State what is meant by the term *ecological niche*.

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..... [1]

(ii) Explain why coral-eating butterfly fish are said to occupy a specialised niche and tuna a generalised niche.

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..... [3]

(b) Fig. 7.1 shows information about two species of butterfly fish.

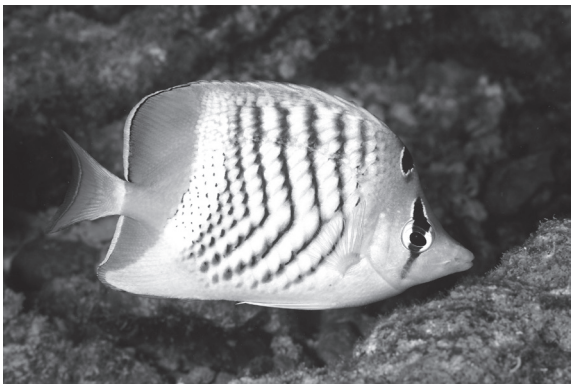
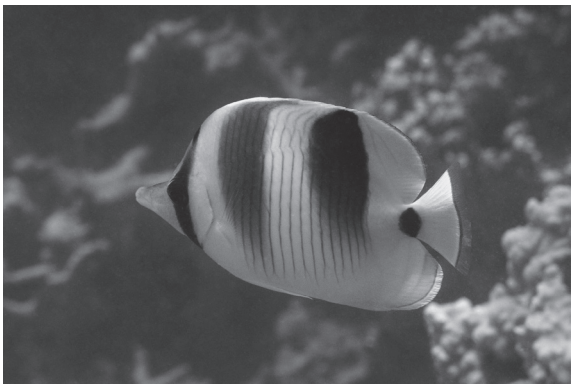
yellowback butterfly fish	**double-saddle butterfly fish**
	
Found at depths of between 10 m and 120 m.	Found at depths of between 2 m and 30 m.
Feed on invertebrates and algae.	Feed on coral polyps and anemones.

Fig. 7.1

Explain how the differences shown in Fig. 7.1 may allow both species to survive on the same coral reef.

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..... [3]

(c) (i) A coral reef is a relatively stable marine environment.

State **one** example of each of the following.

an unstable marine environment .....

an extreme marine environment .....
[2]

(ii) Explain the meaning of the term *biodiversity*.

.....

..... [1]

(iii) Explain why unstable and extreme marine environments tend to have low biodiversity.

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..... [3]

[Total: 13]

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