Cambridge Assessment International Education

Cambridge International AS & A Level

CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER				

4679911833

MARINE SCIENCE **9693/11**

Paper 1 AS Structured Questions **May/June 2021**

1 hour 30 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. Any blank pages are indicated.

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

1 Table 1.1 shows the predicted and actual heights of high and low tides at a port for one day.

Table 1.1

	predicted tide height / m	**actual tide height / m**
high tide	6.1	7.1
low tide	0.9	1.9
high tide	6.9	8.3

(a) (i) Suggest **two** reasons for the differences between the predicted and actual tide heights on this day.

1 .....

2 .....
[2]

(ii) Suggest **two** negative impacts this difference in tide height could have on the local human community.

.....

.....

.....

..... [2]

(b) A spring tide is formed when the Moon and the Sun are in alignment with the Earth.

Fig. 1.1 shows the spring tide bulge over a 24-hour period as the Earth rotates on its axis.

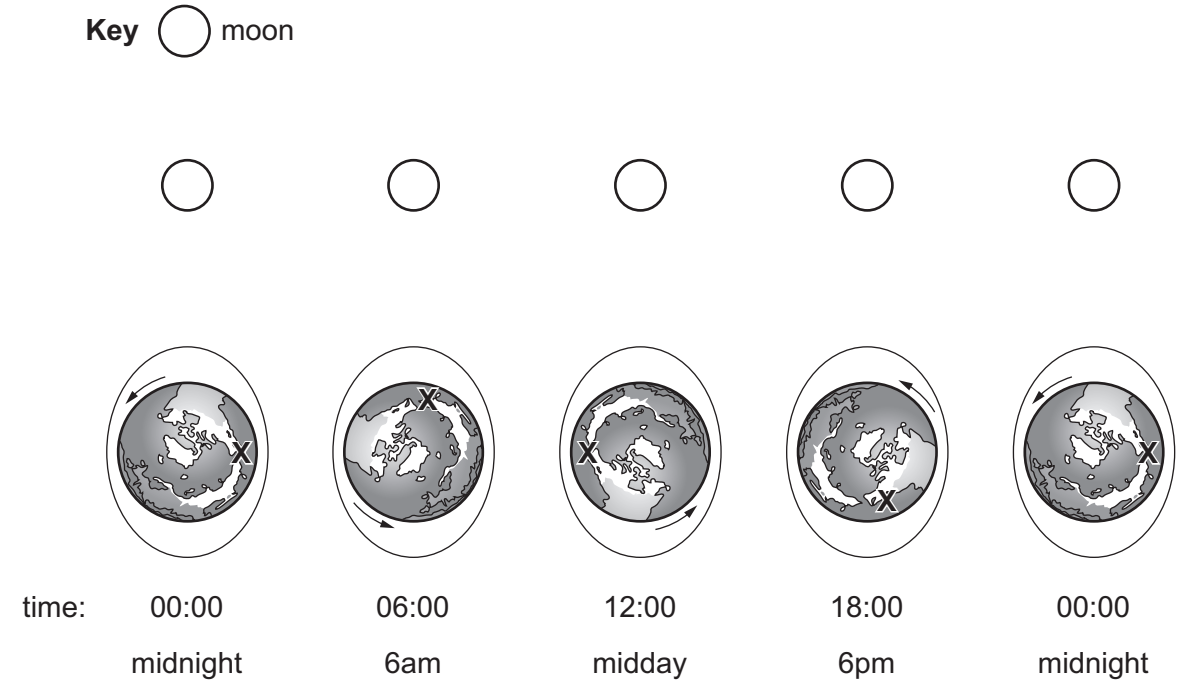
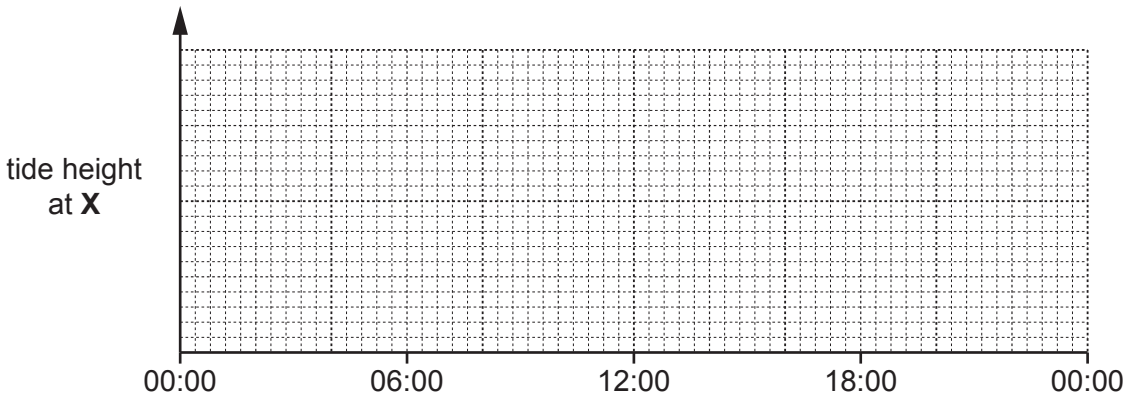


Fig. 1.1

(i) Use the information in Fig. 1.1 to sketch a curve on the axes below, showing the tide height at **X** over a 24-hour period.



[2]

(ii) Describe **one** way the curve would look different when the Moon and the Sun are not aligned with the Earth.

.....

..... [1]

[Total: 7]

2 Fig. 2.1 shows the quantity of energy that enters and leaves a single sea bream. The values are given in arbitrary units (a.u.).

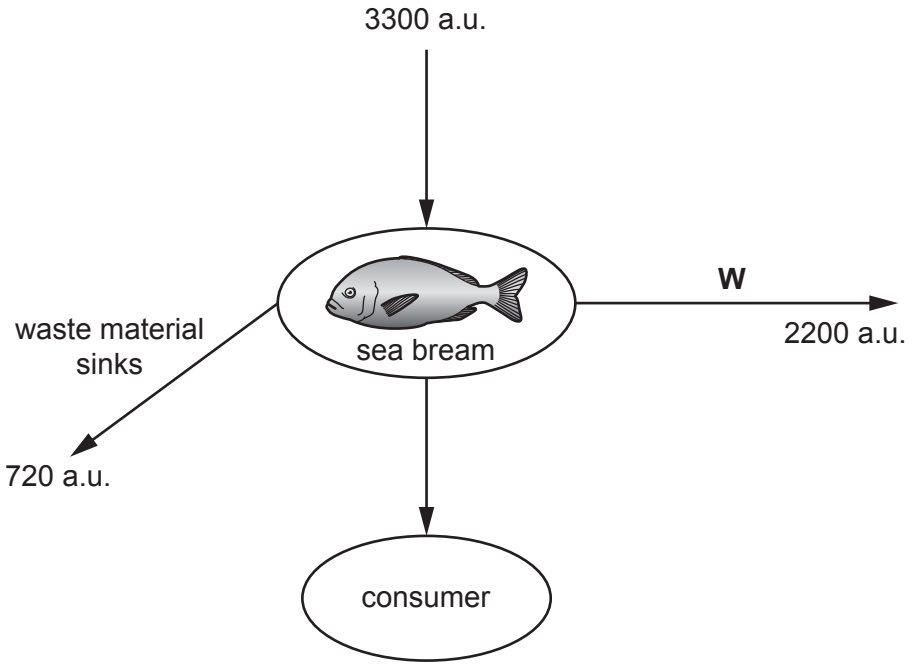


Fig. 2.1

(a) (i) State **two** processes occurring at **W**.

1 .....

2 .....

[2]

(ii) Explain what happens to the energy in the waste material that sinks.

.....

.....

.....

..... [2]

(iii) Calculate the efficiency of energy transfer between the sea bream and the consumer as a percentage.

Space for working.

.....%

[3]

(b) Fig. 2.2 shows a pyramid of numbers for a food chain that includes sea bream.

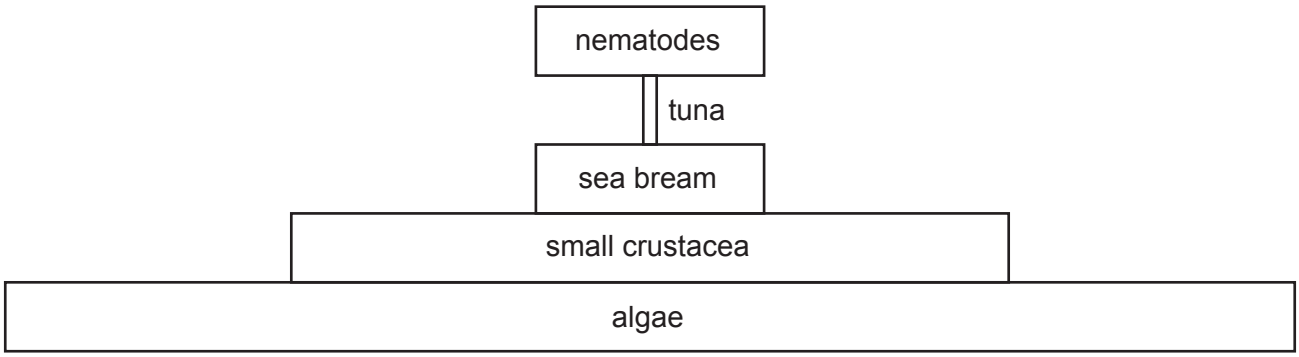


Fig. 2.2

(i) State the trophic level of tuna.

..... [1]

(ii) Explain the reason for the shape of the pyramid of numbers shown in Fig. 2.2.

.....

.....

.....

..... [2]

(iii) Describe how a pyramid of energy for the same food chain will differ from the pyramid of numbers shown in Fig. 2.2.

.....

..... [1]

(c) Sea bream require a variety of nutrients in their diet, including phosphorus and calcium.

(i) State **two** uses of phosphorus in sea bream.

1 .....

2 .....
[2]

(ii) Suggest the pathway of phosphorus from the sea water into the sea bream.

.....

.....

.....

..... [2]

(iii) Not all nutrients in one trophic level are passed onto the next trophic level.

Suggest **one** reason why all the calcium in the sea bream is **not** used by the tuna.

.....

..... [1]

[Total: 16]

3 Fig. 3.1 shows the relationship between temperature, salinity and oxygen concentrations in water.

Each plotted line shows one oxygen concentration, which is stated in the circle on each line. Oxygen concentration is given in mg dm^{-3}.

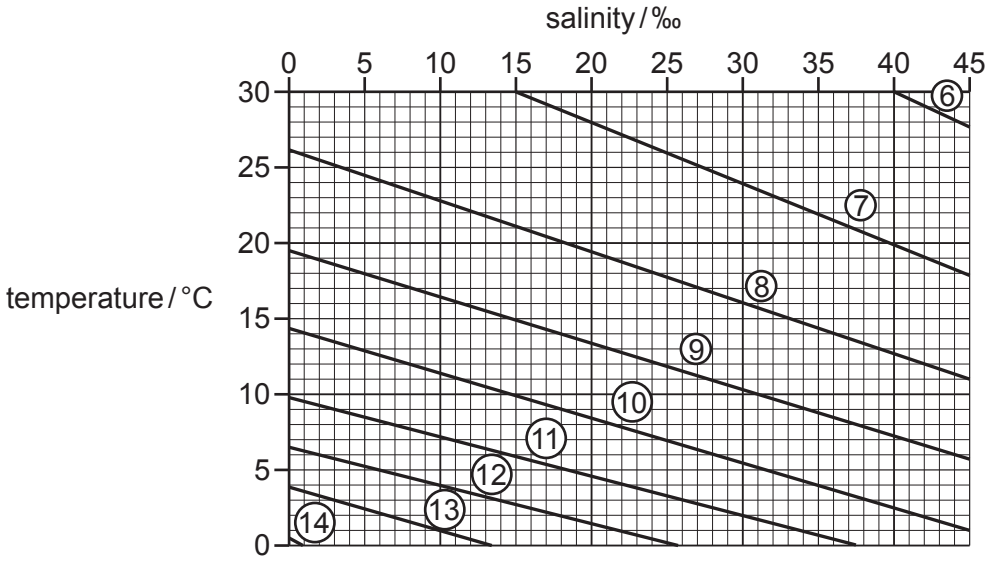


Fig. 3.1

(a) Complete the sentence:

At a given temperature, as salinity increases oxygen concentration ..... [1]

(b) Predict the oxygen concentration in water at a temperature of 15 °C and a salinity of 35 ‰.

..... mg dm^{-3}
[1]

(c) Use the information in Fig. 3.1 to explain the effect of increasing depth on oxygen concentration in water.

.....

.....

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.....

.....

..... [3]

[Total: 5]

4 Fig. 4.1 shows the global historical occurrence of tropical cyclones (hurricanes or typhoons) for a period of 150 years.

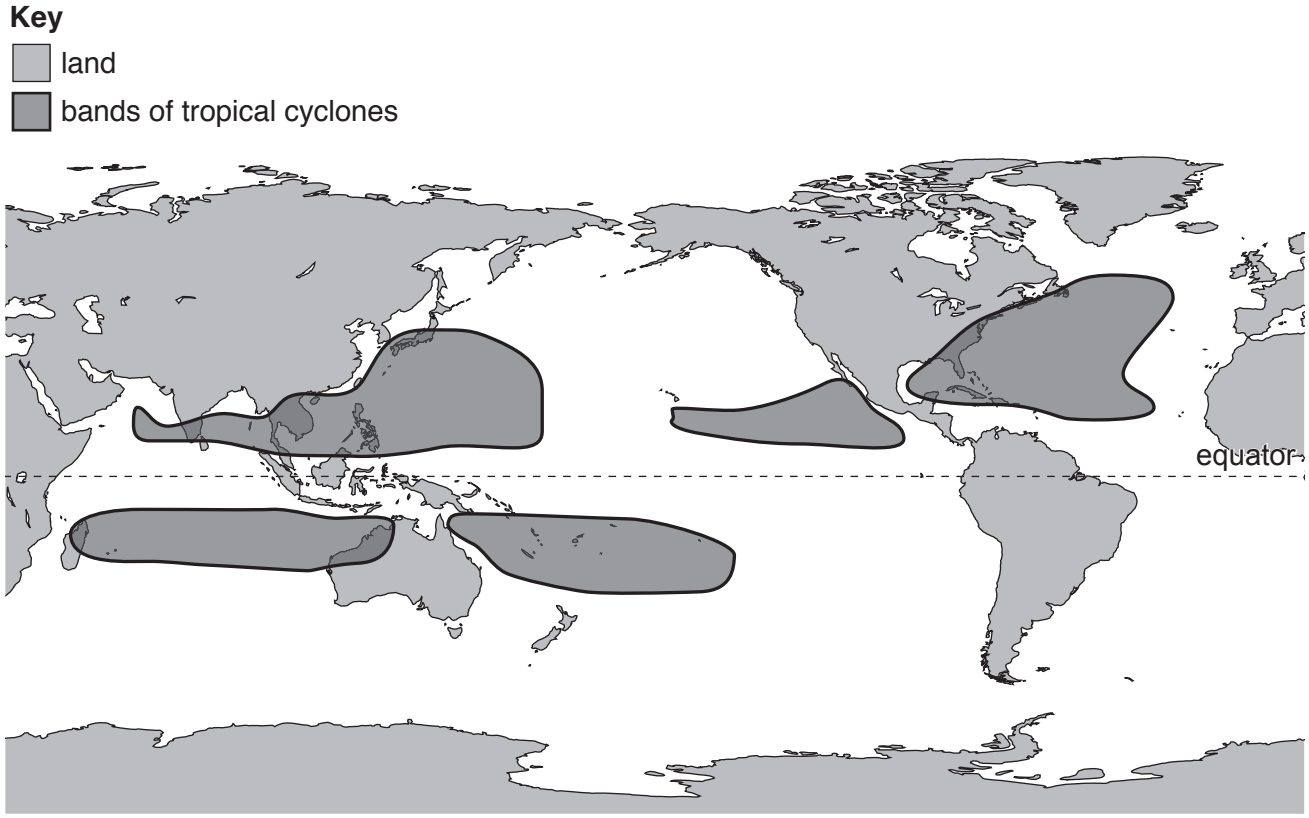

Fig. 4.1

(a) (i) State why **no** tropical cyclones have been observed around the equator.

.....

..... [1]

(ii) Suggest why **no** tropical cyclones have formed around South America.

.....

..... [1]

(b) (i) Describe **and** explain the energy transfers that occur during the formation of a tropical cyclone.

.....

.....

.....

.....

.....

.....

.....

..... [4]

(ii) State how coral reefs reduce the effect of tropical cyclones and storm surges on coastal communities.

.....

..... [1]

(c) Suggest the impacts of a tropical cyclone on a sandy shore.

.....

.....

.....

..... [2]

[Total: 9]

5 (a) (i) State the meaning of the term biodiversity.

.....

.....

.....

..... [2]

(ii) Explain why sandy shores have a low biodiversity compared to rocky shores.

.....

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..... [3]

(iii) Describe how a predator-prey relationship differs from a parasitic relationship.

Use named examples in your answer.

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..... [4]

(b) Name **and** describe the interrelationship between coral polyps and zooxanthellae.

name .....

description .....

.....

.....

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.....

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[4]

[Total: 13]

6 Volcanic islands can form near to convergent (destructive) plate boundaries between two oceanic tectonic plates.

Fig. 6.1 shows the formation of these islands.

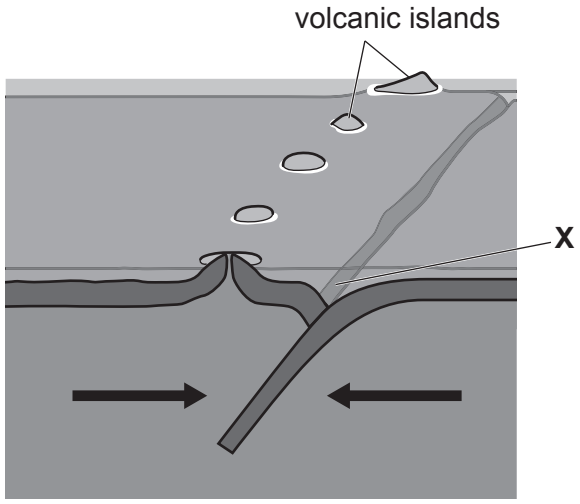

Fig. 6.1

(a) Name the feature labelled **X**.

..... [1]

(b) Outline the processes that create the volcanic islands shown in Fig. 6.1.

.....

.....

.....

.....

.....

.....

.....

..... [4]

(c) Name the type of wave that could be produced when a large underwater earthquake suddenly displaces a large volume of water.

..... [1]

[Total: 6]

7 Fig. 7.1 shows the location of the Great Barrier Reef on the east coast of Australia.

Fig. 7.1

(a) State **three** conditions that are suitable for tropical reef-building coral growth on the Great Barrier Reef.

1 .....

2 .....

3 .....

[3]

(b) In late summer of 2016 around 30% of the Great Barrier Reef coral polyps died.

This was particularly noticeable on the northern end of the reef.

Suggest **three** causes for the death of the corals.

1 .....

.....

2 .....

.....

3 .....

.....

[3]

(c) The rate of loss in 2016 was higher than historical coral loss events.

Suggest how scientists determined the historical rate of loss.

.....

.....

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.....

.....

..... [3]

[Total: 9]

8 Wet and dry monsoon winds occur in areas of the Asian continent at different times of the year.

(a) Describe the factors that cause the formation of a dry monsoon wind.

.....

.....

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.....

.....

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..... [4]

(b) **(i)** During the wet monsoon there is high precipitation over the land.

Discuss the impact this could have on the physical and chemical properties of sea water in this region.

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..... [4]

(ii) Explain how a change in the chemical properties of sea water could increase the productivity of the oceans in this region.

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..... [2]

[Total: 10]

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