Cambridge International AS & A Level

Cambridge Assessment International Education
Cambridge International Advanced Subsidiary and Advanced Level

CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER

MARINE SCIENCE **9693/12**

Paper 1 AS Structured Questions **May/June 2019**

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 **16** printed pages and **4** blank pages.

DC (CE/CB) 164105/4

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

1 Water coming out of hydrothermal vents can be at temperatures over 400 °C.

(a) State **two** other features of the water coming out of hydrothermal vents.

1 .....

2 .....
[2]

(b) A hydrothermal vent can be described as an ecosystem.

(i) Define the term *ecosystem*.

.....

..... [1]

(ii) Food chains around hydrothermal vents do not begin with photosynthetic organisms.

Suggest **one** reason, other than the high temperatures, why food chains around hydrothermal vents do not begin with photosynthetic organisms.

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..... [1]

(c) Explain why hydrothermal vents are found at mid-ocean ridges.

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..... [2]

(d) Describe **one** example of mutualism and **one** example of succession at hydrothermal vents.

mutualism .....

.....

succession .....

.....
[2]

(e) Explain why hydrothermal vents have low biodiversity.

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..... [2]

[Total: 10]

2 **(a)** Name the type of reef that forms around new oceanic volcanoes.

..... [1]

(b) Corals that build reefs usually grow in shallow waters at depths down to 30 m.

Dead coral has been found in atoll lagoons at depths of 1200 m. This dead coral reef is attached to volcanic rock.

(i) Explain how this provides evidence to support the Darwin-Dana-Daly theory of atoll formation.

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(ii) Describe how the age of dead coral can be determined.

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..... [3]

[Total: 7]

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3 Fig. 3.1 shows part of a marine food web.

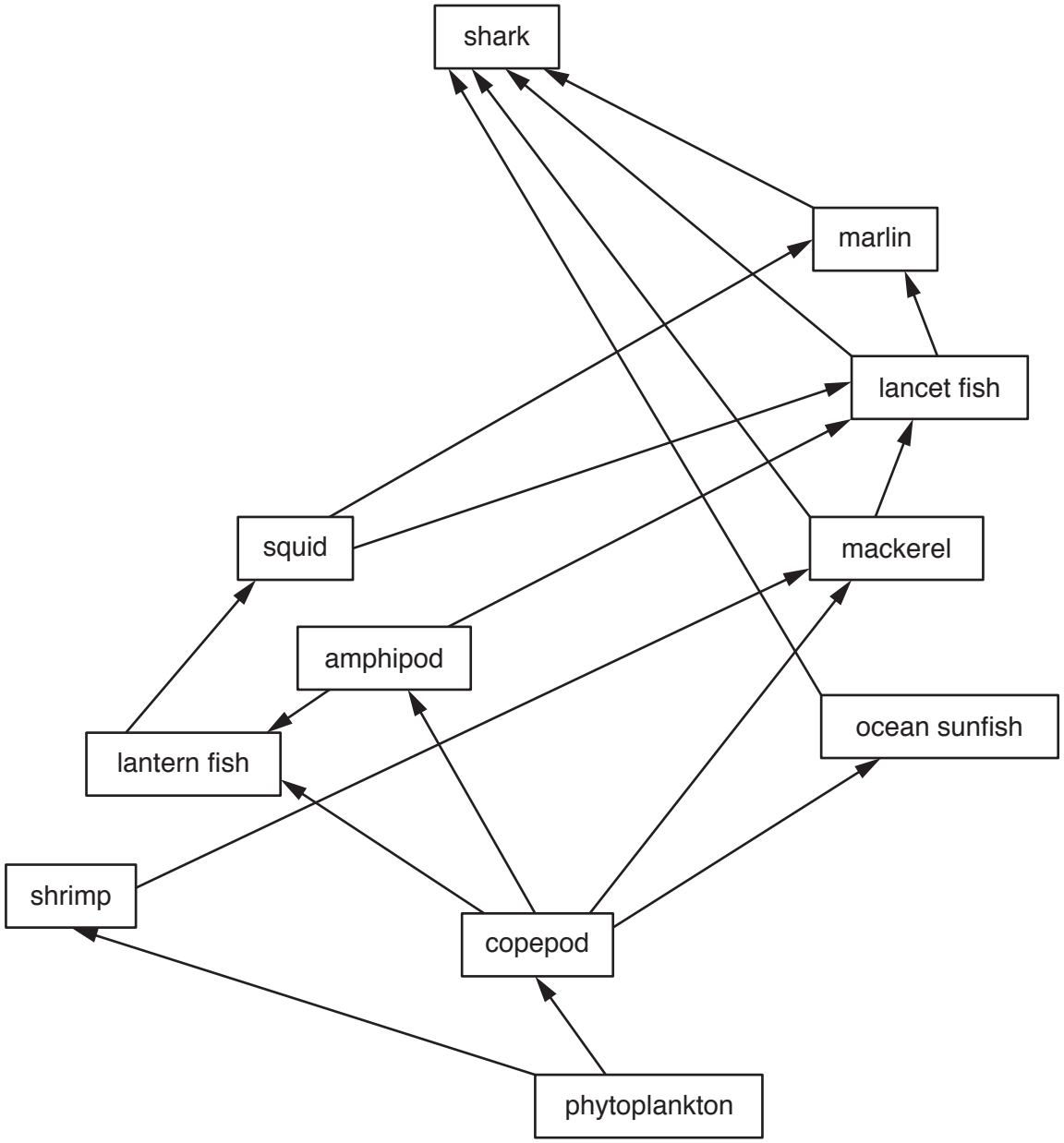

Fig. 3.1

(a) (i) Tuna are predators of shrimp, squid and mackerel. Tuna are prey to sharks and marlin.

Use this information to add tuna to the food web in Fig. 3.1. [2]

(ii) Define the term *ecological niche*.

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..... [2]

(iii) Use the information in Fig. 3.1 to explain why sharks can be described as occupying a general ecological niche.

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..... [1]

(b) Nematodes are found in the digestive system of mackerel. The nematodes obtain energy from undigested food that the mackerel have eaten.

(i) Name this type of species interrelationship.

..... [1]

(ii) State the trophic level of these nematodes.

..... [1]

(iii) Suggest why nematodes are not normally included in food webs, such as the one shown in Fig. 3.1.

.....

..... [1]

[Turn over

(c) Fig. 3.2 shows a food chain from Fig. 3.1.

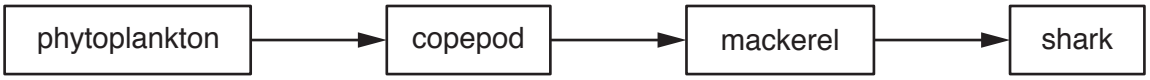

Fig. 3.2

(i) Explain why not all of the energy consumed by the mackerel population passes to the shark population in this food chain.

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..... [3]

(ii) Sketch and label a pyramid of energy for the food chain shown in Fig. 3.2.

[3]

[Total: 14]

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4 **(a)** Offshore coral reefs protect shores from wave action.

Scientists measured the mean percentage reduction in wave height along coastlines with different types of ecosystems.

Their results are shown in Fig. 4.1.

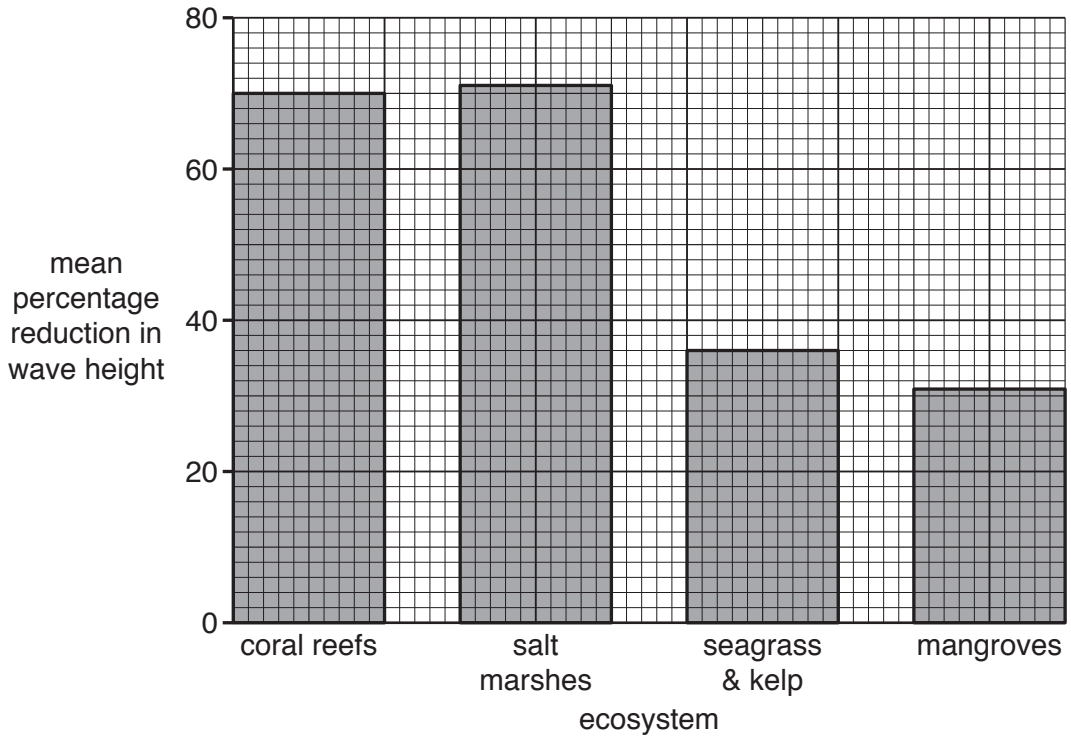

Fig. 4.1

(i) Use the data shown in Fig. 4.1 to compare the reduction in wave height by coral reefs with the reduction by other coastline ecosystems.

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..... [3]

(ii) A wave has a height of 0.9 m before it reaches a coral reef.

Use Fig. 4.1 to predict the height of the wave when it reaches the shore.

Show your working.

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[2]

(iii) Some of the waves arriving at coral reefs were over 2 m in height.

No data were collected for the other coastline ecosystems for waves greater than 1 m.

Suggest why data about larger waves could not be collected for other ecosystems.

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..... [1]

(iv) Explain why a reduction in the height of waves reduces the damage to shores.

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..... [2]

(v) Describe **two** effects on coastal communities if coral reefs are destroyed.

1 .....

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2 .....

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[2]

(b) A large area of reef in the Indian Ocean died in 1997.

The reef death was caused by a combination of factors, including smoke from forest fires and an unusual upwelling of nitrogen and phosphorus.

(i) Suggest how forest fires could lead to coral death.

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..... [1]

(ii) Explain how upwelling of nitrogen and phosphorus could lead to coral death.

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..... [3]

[Total: 14]

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5 **(a)** The Sun is approximately 400 times larger than the Moon.

Describe why the Moon has more effect than the Sun on the tides on the Earth.

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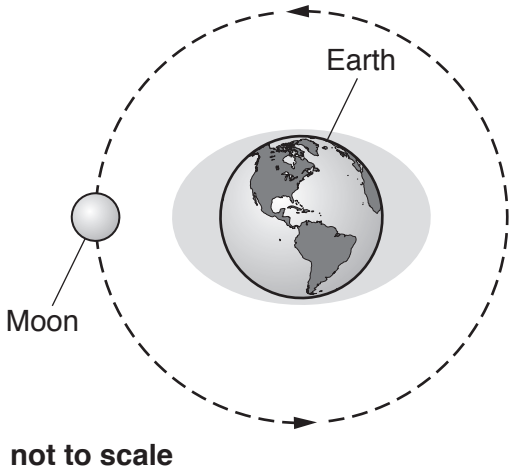
..... [1]

(b) Fig. 5.1 shows the location of the Moon relative to the Earth.



not to scale

Fig. 5.1

(i) On Fig. 5.1, write the letter **X** on the Earth to show one location that would be experiencing high tide. [1]

(ii) Explain how the Moon causes high and low tides.

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..... [4]

(iii) On Fig. 5.1, write the letter **S** to indicate the position of the Sun that would cause the largest possible tidal range, when the Moon is in the position shown. [1]

(c) Fig. 5.2 shows the maximum tidal range, in metres, at various locations in the Bay of Fundy, Canada. The Bay of Fundy has the largest tidal range in the world.

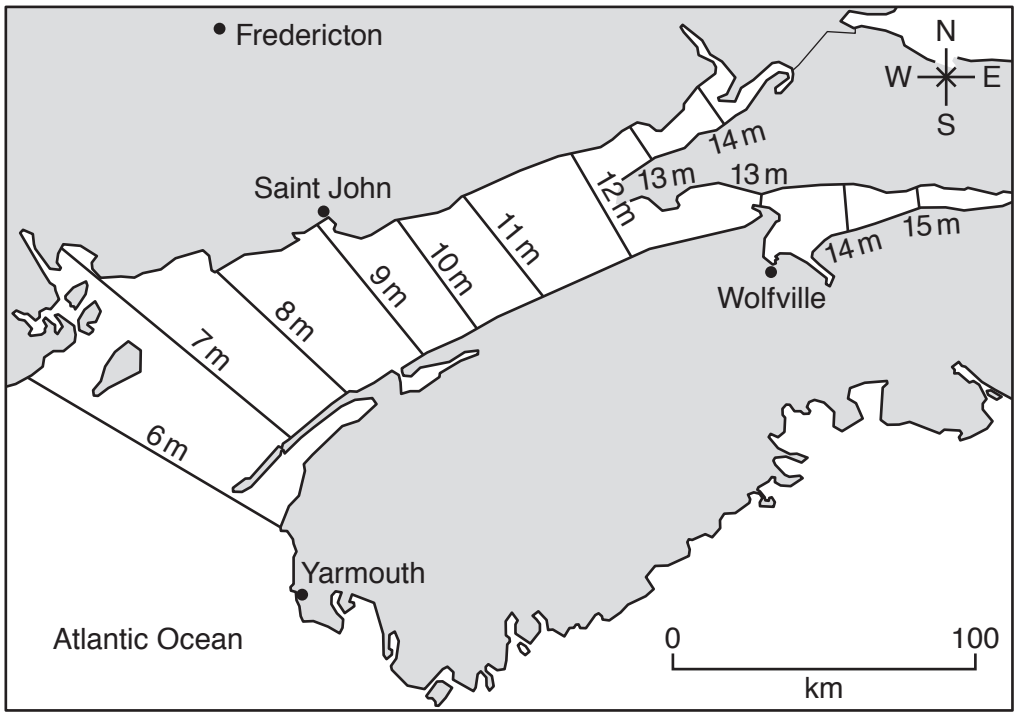

Fig. 5.2

(i) Use the information in the map in Fig. 5.2 to suggest why the Bay of Fundy has such a large tidal range.

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..... [2]

(ii) State **two** factors that could cause a high tide to be higher than expected in the Bay of Fundy.

1 .....

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2 .....

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[2]

[Total: 11]

6 Fig. 6.1 shows the boundary between two tectonic plates and the density of the rocks at three locations.

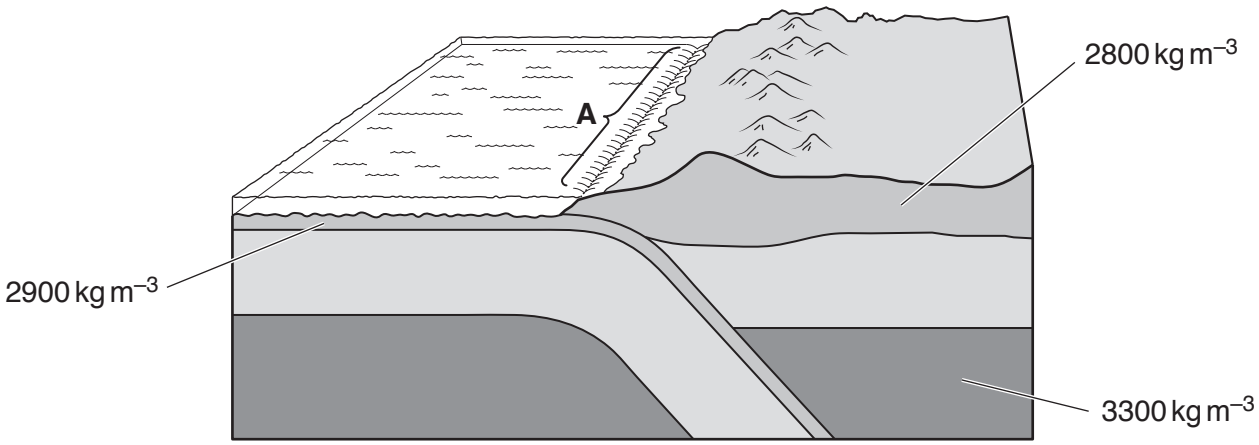

Fig. 6.1

(a) (i) Draw **two** arrows on Fig. 6.1 to show the direction of movement of the two plates. [1]

(ii) Name the type of tectonic plate boundary shown in Fig. 6.1.

..... [1]

(iii) Name the feature indicated by the bracket labelled **A**.

..... [1]

(iv) Explain why volcanoes occur near this plate boundary.

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(b) (i) Name the theory that explains why continental plates tend to have shallower seas than oceanic plates.

..... [1]

(ii) Fig. 6.1 shows the density and thickness of rock at three locations.

With reference to the information in Fig. 6.1, explain why the depth of the seas above continental plates is less than that above oceanic plates.

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..... [3]

[Total: 10]

7 Sardines and anchovies are found in shoals.

(a) Describe the advantages of shoaling behaviour.

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..... [3]

(b) Fisheries have reported a change in the size of anchovy shoals following heavy rainfall leading to high volumes of river runoff.

Fig. 7.1 shows the anchovy catch near the mouth of a river in Spain, per month, compared with the mean monthly catch over a one year period.

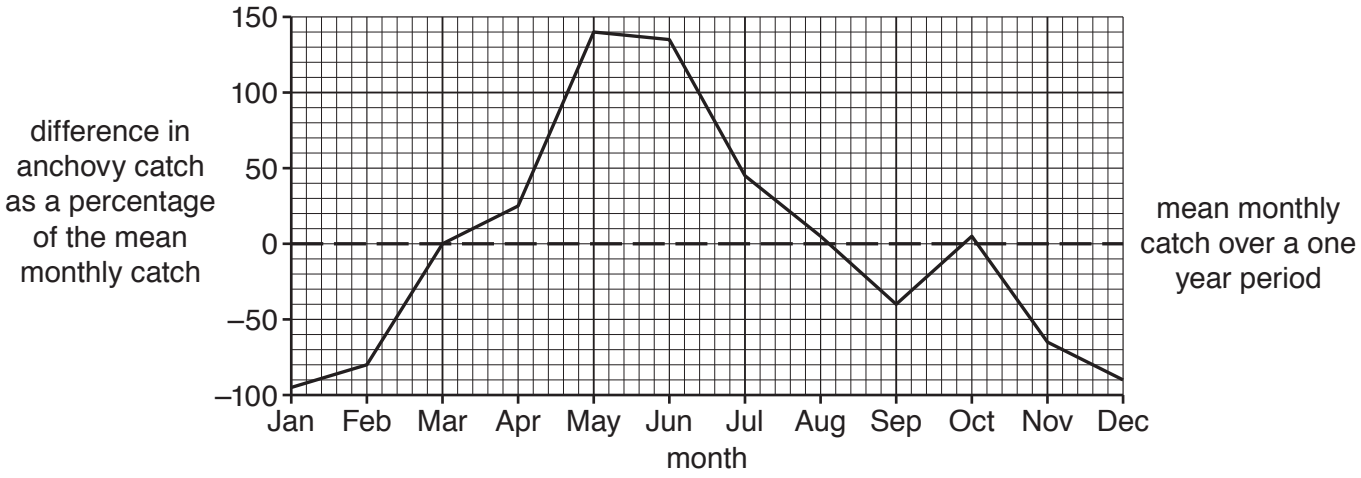

Fig. 7.1

Fig. 7.2 shows the river runoff for the same area.

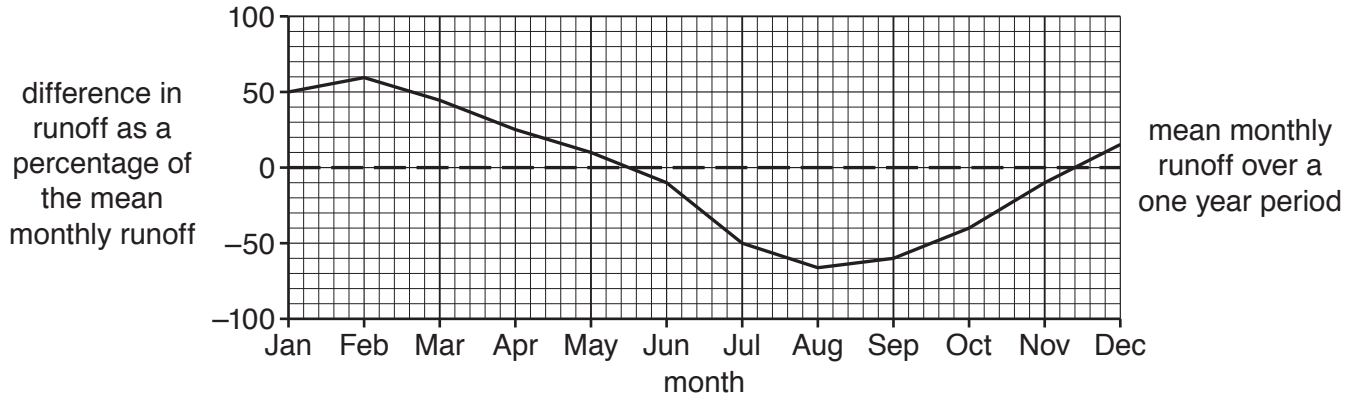

Fig. 7.2

(i) Evaluate whether the data in Figs. 7.1 and 7.2 support the idea that increasing rainfall affects shoal size of anchovies.

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(ii) Suggest how rainfall could affect marine fish populations.

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[Total: 9]

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