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9693/01

October/November 2013

1 hour 30 minutes

Candidates answer on the Question Paper.

No Additional Materials are required.

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 a pencil for any diagrams, graphs or rough work.
Do not use staples, paper clips, highlighters, glue or correction fluid.
DO NOT WRITE IN ANY BARCODES.

Answer **all** questions.

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.

Electronic calculators may be used.

This document consists of **14** printed pages and **2** blank pages.

- 1 (a) Fig. 1.1 shows the relative numbers of organisms in two identical food chains.

One food chain is from a marine reserve and the other is from an area of ocean that is fished.

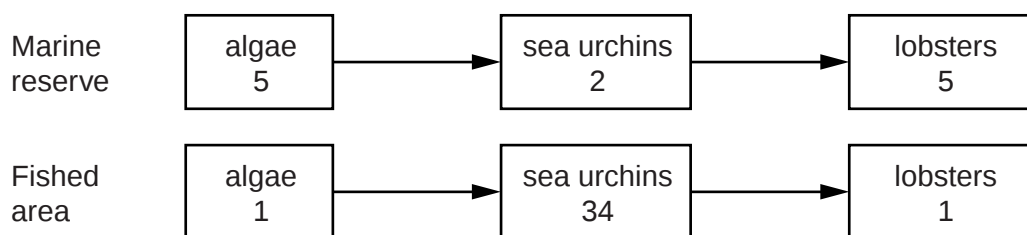


Fig. 1.1

- (i) State **two** differences between these food chains and suggest an explanation for each difference.

1 difference

explanation

.....

2 difference

explanation

..... [4]

- (ii) With reference to Fig. 1.1, explain the meanings of the terms *predator*, *prey* and *trophic level*.

predator

.....

.....

prey

.....

.....

trophic level

.....

..... [6]

(b) Fig. 1.2 shows a typical marine predator-prey relationship.

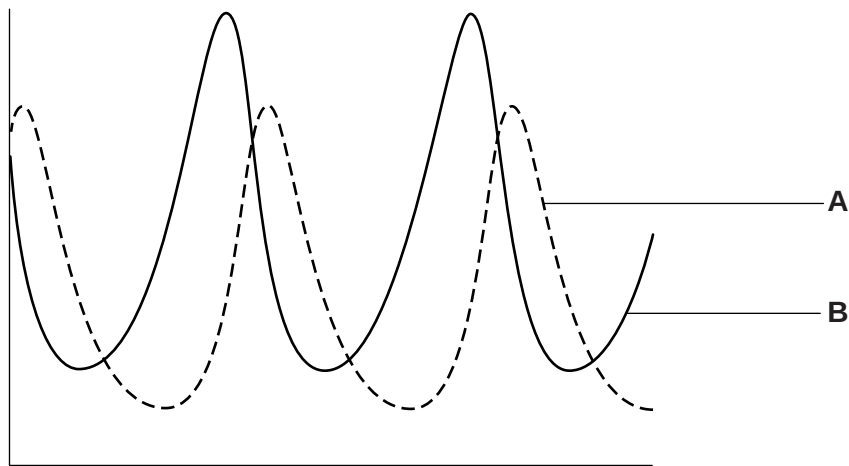


Fig. 1.2

(i) Add an appropriate label to each axis. [2]

(ii) State which line, **A** or **B**, represents the predator. Explain your answer.

.....
 [1]

[Total: 13]

- 2 Fig. 2.1 shows the relative amounts of energy in arbitrary units at different trophic levels in a marine food chain.

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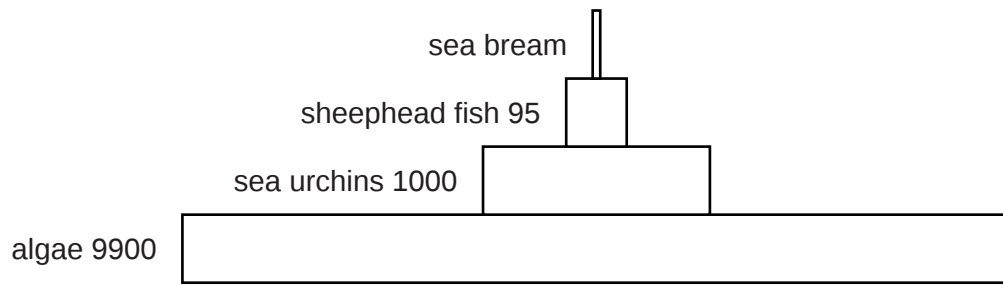


Fig. 2.1

- (a) Calculate the percentage of energy lost between the algae and the sea urchins.

[2]

- (b) Estimate the relative amount of energy in the sea bream.

..... [1]

- (c) State **three** ways in which energy is lost from a food chain.

1

.....

2

.....

3

..... [3]

[Total: 6]

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Turn over for Q3

- 3 (a) Fig. 3.1 shows the productivity at different depths in the Indian Ocean.

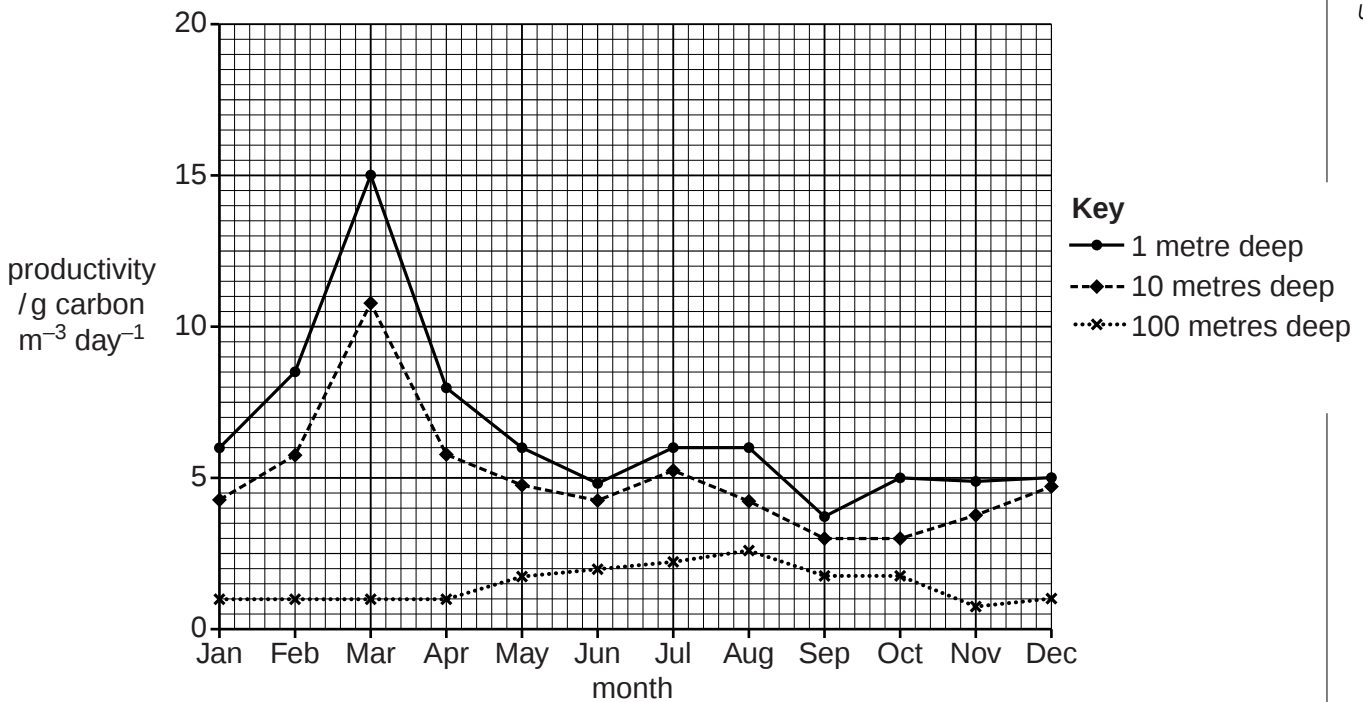


Fig. 3.1

- (i) State the month in which the productivity at a depth of 1 metre was greatest.

..... [1]

- (ii) Describe and explain the relationship between productivity and depth.

description

.....

explanation

.....

.....

.....

..... [3]

- (b) Hydrothermal vents are found at great depths where photosynthesis does not take place.

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Chemosynthetic bacteria are found in these areas.

State **one** similarity and **one** difference between photosynthesis and chemosynthesis.

(i) similarity
..... [1]

difference.....
..... [1]

- (ii) Explain why hydrothermal vents have a low biodiversity.

.....
.....
.....
.....
.....
..... [3]

[Total: 9]

.....[4

Suggest **two** factors, other than temperature, that influence the time of spawning.

1

.....

2

.....[2]

Coral eggs and sperm are collected from the reef and grown in culture. The larvae are then transplanted onto the reef.

```
graph TD; Step1[Step 1  
Collect gametes (eggs and sperm) from reef.] --> Step2[Step 2  
Transfer gametes to fertilisation tank.]; Step2 --> Step3[Step 3  
Stir gametes.]; Step3 --> Step4[Step 4  
Leave gametes to fertilise for 15 minutes.]; Step4 --> Step5[Step 5  
Transfer embryos to rearing tank.]; Step5 --> Step6[Step 6  
Leave undisturbed and monitor water quality.]; Step6 --> Step7[Step 7  
Transfer larvae to reef.];
```

The flowchart illustrates a seven-step process for coral reef restoration. It begins with Step 1: 'Collect gametes (eggs and sperm) from reef.' This leads to Step 2: 'Transfer gametes to fertilisation tank.' Step 2 then leads to Step 3: 'Stir gametes.' Step 3 leads to Step 4: 'Leave gametes to fertilise for 15 minutes.' Step 4 leads to Step 5: 'Transfer embryos to rearing tank.' Step 5 leads to Step 6: 'Leave undisturbed and monitor water quality.' Finally, Step 6 leads to Step 7: 'Transfer larvae to reef.'

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Suggest a reason for each of the following steps.

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- (i) stirring the gametes in step 3

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

- (ii) leaving undisturbed in step 6

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

- (d) Explain how coral reefs provide protection for coastal areas.

.....
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.....
.....
.....[3]

[Total: 11]

- 5 (a) Salinity is the mass of salts dissolved in 1 kg of water. It is measured in parts per thousand (‰).

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The mean salinity of the world's oceans is 35‰. The salinity was measured in three different seas.

Table 5.1 shows the mean salinity in these seas.

Table 5.1

sea	mean salinity (‰)
A	36
B	300
C	7

- (i) Compare the salinity of the three seas.

.....

.....

.....

.....

.....

..... [3]

- (ii) Suggest explanations for the salinity in each of the following seas.

Sea B

.....

.....

Sea C

.....

.....

..... [5]

[4]

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- 6 (a) Fig. 6.1 shows the main features of the ocean floor.

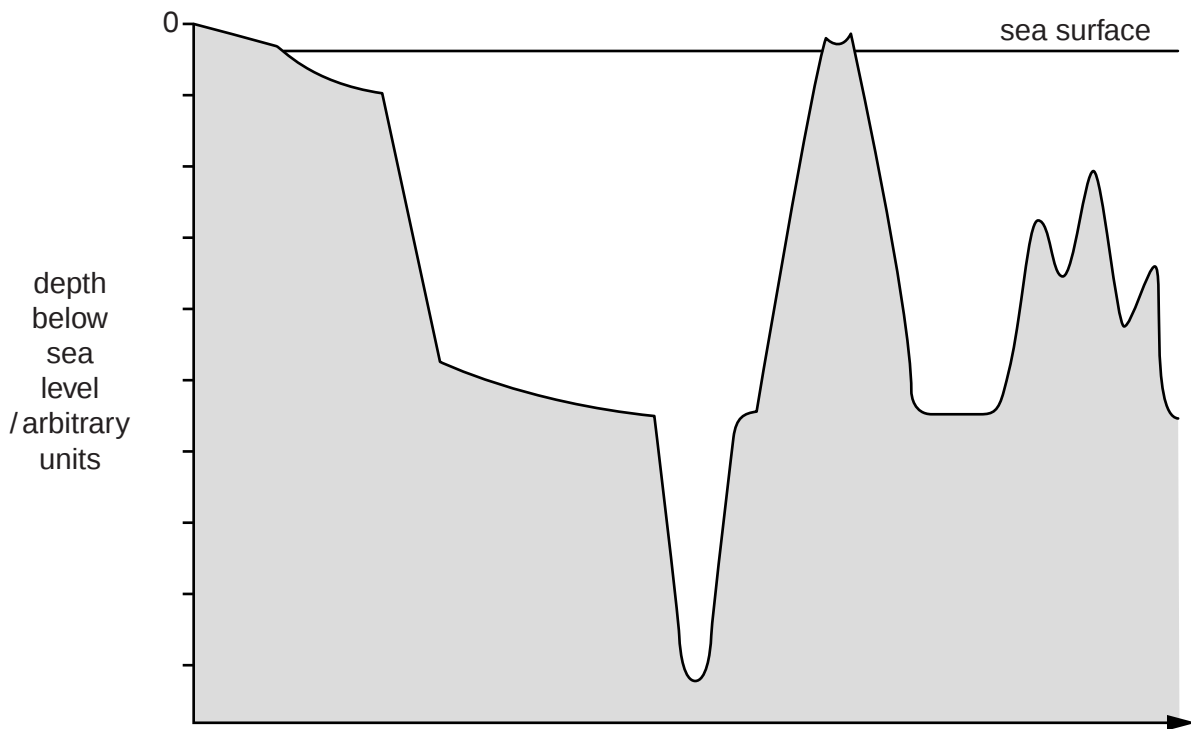


Fig. 6.1

- (i) Label an *abyssal plain* on Fig. 6.1. Use a guideline and the letter A. [1]

- (ii) Describe the main features of an abyssal plain.

.....

.....

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..... [3]

- (iii) Explain how an abyssal plain is formed.

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..... [3]

- (b) (i) With reference to Fig. 6.1, explain how underwater earthquakes are caused.

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.....[3]

- (ii) Explain how these underwater earthquakes can cause a tsunami.

.....

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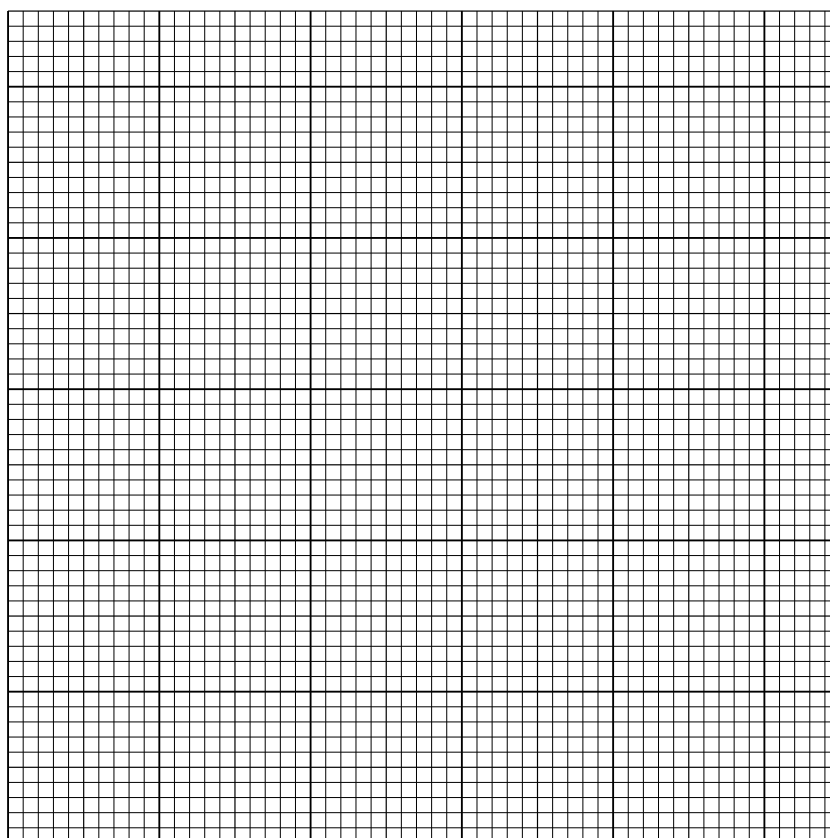
.....[2]

- (c) Table 6.1 shows how the wavelength of a tsunami wave varies with ocean depth.

Table 6.1

depth / m	wavelength / km
10	10
50	23
200	48
500	75
1000	105

- (i) Plot a graph to show the effect of depth of the ocean on the wavelength of the tsunami wave.



[3]

- (ii) Describe the relationship between the ocean depth and the wavelength of the tsunami wave.

.....

.....

..... [2]

[Total: 17]

(i) phosphorus [1]

(b) Explain how nitrogen atoms, present in nitrate ions in the soil, may become incorporated into organic compounds in the tissue of a marine fish.

.....[5]

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