

Ecosystem

Question Paper 2

Level	International A Level
Subject	Biology
Exam Board	Edexcel
Topic	Energy Flow , Ecosystem and Environment
Sub-Topic	Ecosystem
Booklet	Question paper 2

Time Allowed: 53 minutes

Score: /44

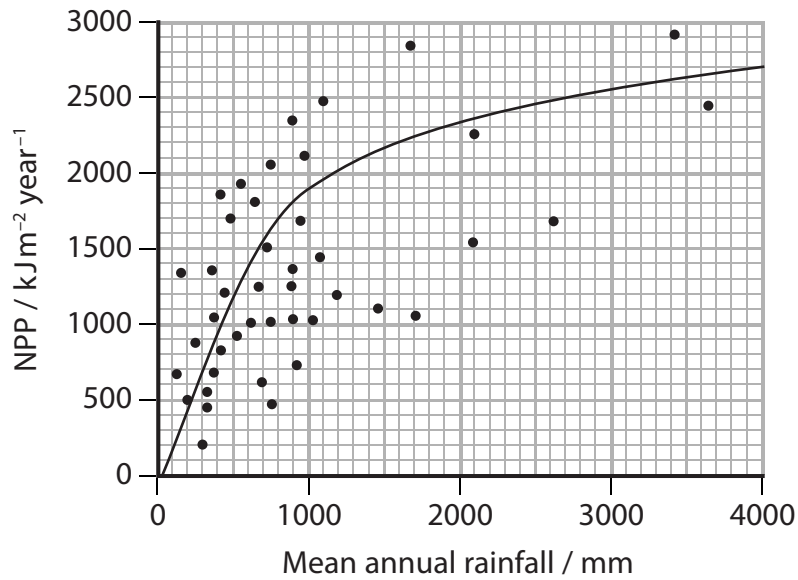
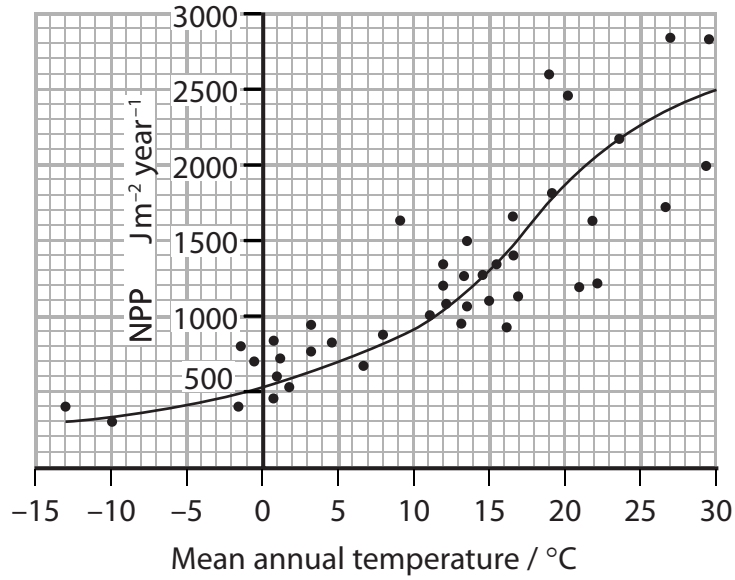
Percentage: /100

Grade Boundaries:

A*	A	B	C	D	E	U
>85%	77.5%	70%	62.5%	57.5%	45%	<45%

- 1 (a) The net primary productivity (NPP) of an ecosystem is affected by temperature and rainfall.

The graphs below show the relationship between NPP and these two environmental factors.



- (i) Explain the meaning of the term **net primary productivity (NPP)**.

(2)

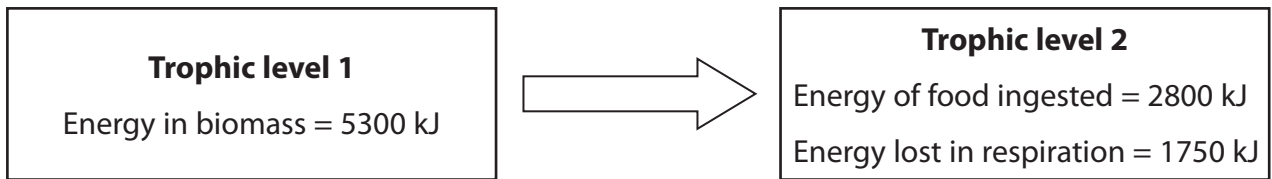
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(b) The diagram below shows the energy content of two trophic levels.



Calculate the percentage of energy transferred from trophic level 1 to trophic level 2.

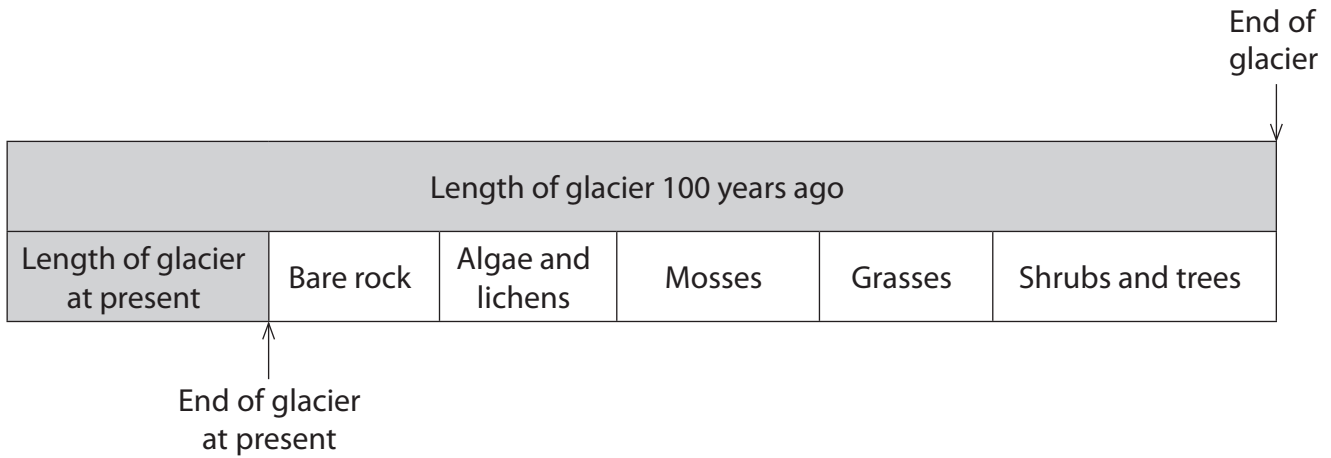
(2)

Answer = %

(Total for Question 1 = 12 marks)

- 2 Glaciers are long, large masses of ice that formed thousands of years ago. As a result of warmer climates, more ice is melting. This is reducing the length of the glaciers. As a result, bare rock that was once covered by the glacier becomes exposed.

The diagram below shows the length of a glacier 100 years ago and the glacier at present. It also shows what is now found in a transect taken from where the front edge of the glacier is at present.



- (a) Using the information in the diagram, describe and explain the changes in the distribution of organisms with distance from the front edge of this glacier.

(3)

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3 The photograph below shows a giant panda.

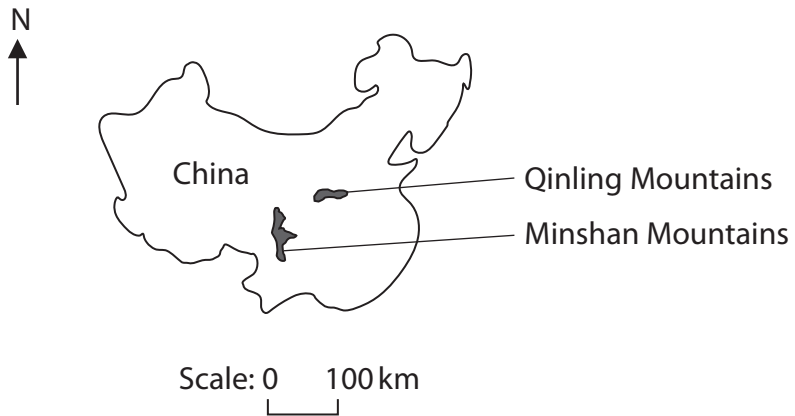


Magnification $\times 0.03$

The giant panda is an endangered species of bear, native to China.

Giant pandas were once found throughout the lowland forests of southeast China.

Now they are found only in isolated patches of forest in the mountains. The majority of giant pandas are found in the Minshan Mountains, the rest are in the Qinling Mountains, which are shown in the map below.



(ii) Explain how the results of this DNA analysis can be used to estimate the number of giant pandas in the wild.

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(Total for Question 3 = 13 marks)

- 4 The zebrafish is a tropical freshwater fish that has been genetically modified.
The photograph below shows a zebrafish.



Magnification $\times 1$

- (a) The transcription factor known as Sp2 has been studied. In this study, a gene from red coral cells was added to the genome of the zebrafish.

The gene from red coral cells produces a red protein when the synthesis of Sp2 also occurs.

- (i) Explain what is meant by the term **transcription factor**.

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(ii) Suggest how this gene is removed from the red coral cells and then added to the zebrafish genome.

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(b) Genetically modified zebrafish, in a variety of bright colours, can be bought from some pet shops.

The colour of the zebrafish depends on which gene has been added to its genome.

Suggest **one** potential risk to other organisms in a river ecosystem if a genetically modified zebrafish escaped into this river.

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- (c) The optimum temperature range for zebrafish to survive is 17–29°C.

An investigation was carried out to study the effect of water temperature on the survival of both genetically modified zebrafish and non-genetically modified zebrafish.

The results are shown in the table below.

Type of zebrafish	Lowest temperature for survival / °C	
	Mean	Standard deviation
Non-genetically modified	5.3	1.3
With gene for red protein	9.2	1.9
With gene for green protein	6.4	1.3

- (i) These results suggest that there would be less risk to the environment if zebrafish with the gene for the red protein escaped into a cold water river compared with non-genetically modified zebrafish.

Using the information in the table, give the evidence for this.

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- (ii) These results also suggest that there may be no difference in the lowest temperature for survival of the zebrafish with the gene for the green protein and the non-genetically modified zebrafish.

Using the information in the table, give the evidence for this.

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