Biodiversity

Question Paper 6

Level	International A Level
Subject	Biology
Exam Board	CIE
Topic	Biodiversity, classification and conservation
Sub Topic	Biodiversity
Booklet	Theory
Paper Type	Question Paper 6

Time Allowed : **62 minutes**

Score : **/ 51**

Percentage : **/100**

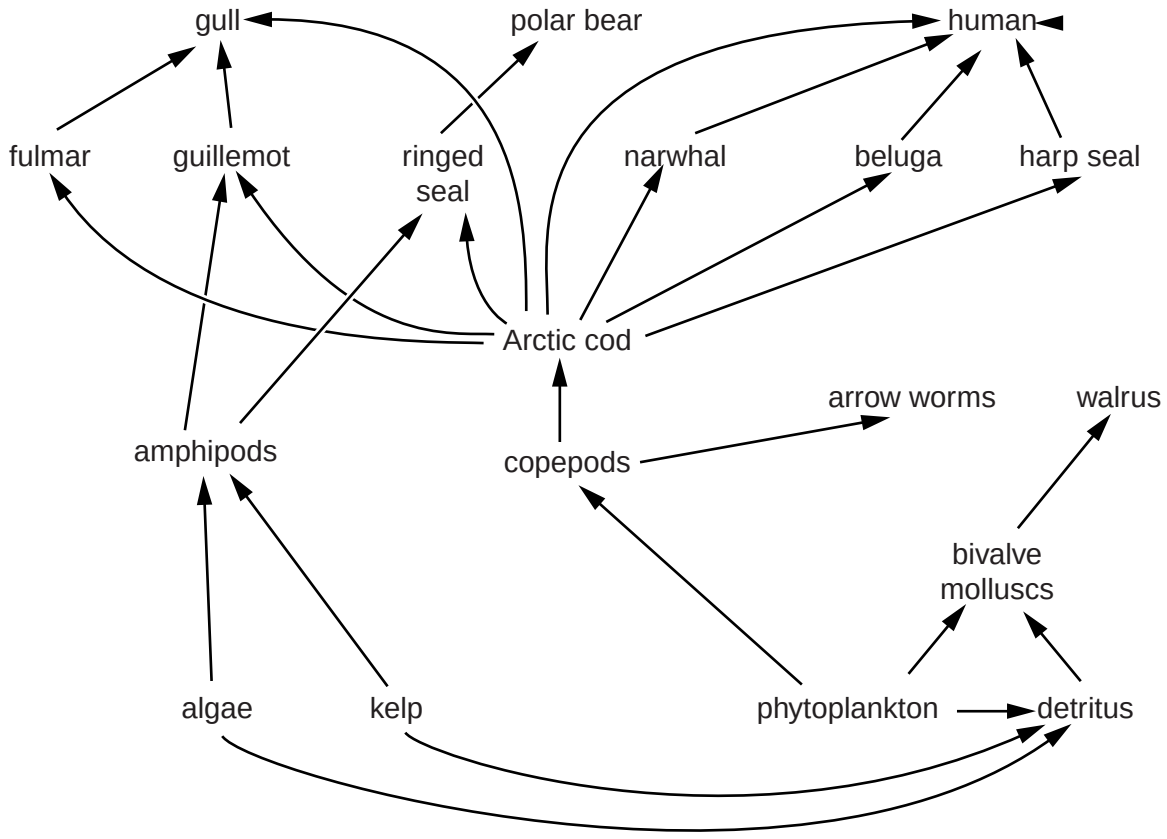
Grade Boundaries:

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

1 Lancaster Sound in the Canadian Arctic is a very productive marine environment and supports large populations of sea birds and marine mammals.

Studies of the area have shown the importance of Arctic cod, *Boreogadus saida*, in the flow of energy to marine birds, such as guillemots and fulmars, and marine mammals, such as narwhals and belugas. Arctic cod forms the main, or only, source of food for many such animals.

The flow of energy through the food web in Lancaster Sound is shown in Fig. 4.1.



Note: detritus is dead and decaying matter

Fig. 4.1

(a) Name the trophic levels occupied by the following organisms in the food web in Fig. 4.1:

kelp .....

arrow worms .....

narwhals. ..... [3]

(b) The population of polar bears in the Lancaster Sound area is quite small in comparison to populations of animals that feed on Arctic cod.

Using **only** the information shown in Fig. 4.1, explain why the population of polar bears is small.

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.....[4]

(c) Populations of many fish species are under threat of extinction as a result of over-fishing.

Explain the likely consequences of over-fishing of Arctic cod.

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[Total: 10]

2 A woodland ecosystem was investigated and a food web was constructed. This food web is shown in Fig. 6.1.

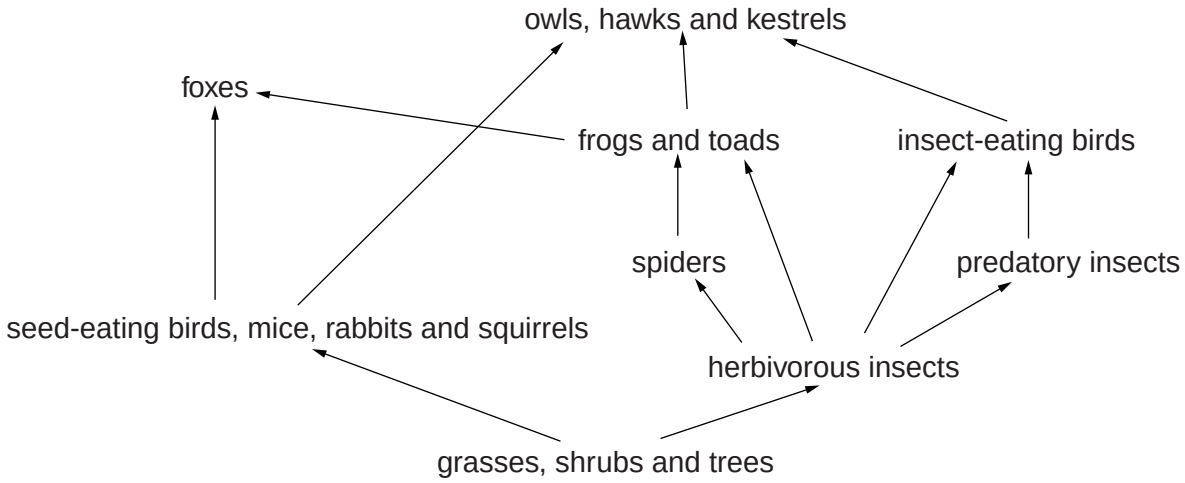

Fig. 6.1

(a) State the meaning of the term *ecosystem*.

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.....[2]

(b) Name one group of organisms from Fig. 6.1 that are:

(i) producers

.....[1]

(ii) **only** secondary consumers.

.....[1]

(c) Explain why only a small percentage of the energy present at each trophic level is available to the organisms at the next level.

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(d) Fig. 6.1 shows the flow of energy but not the cycling of nutrients in the ecosystem.

Outline what happens to the nitrogen-containing compounds in the organisms at the top of the food web.

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.....[3]

[Total: 10]

3 **(a)** Explain what is meant by the term ecosystem.

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..... [2]

Fig. 6.1 shows the energy flow through a river ecosystem.

All the figures are in kJ m^{-2} per year.

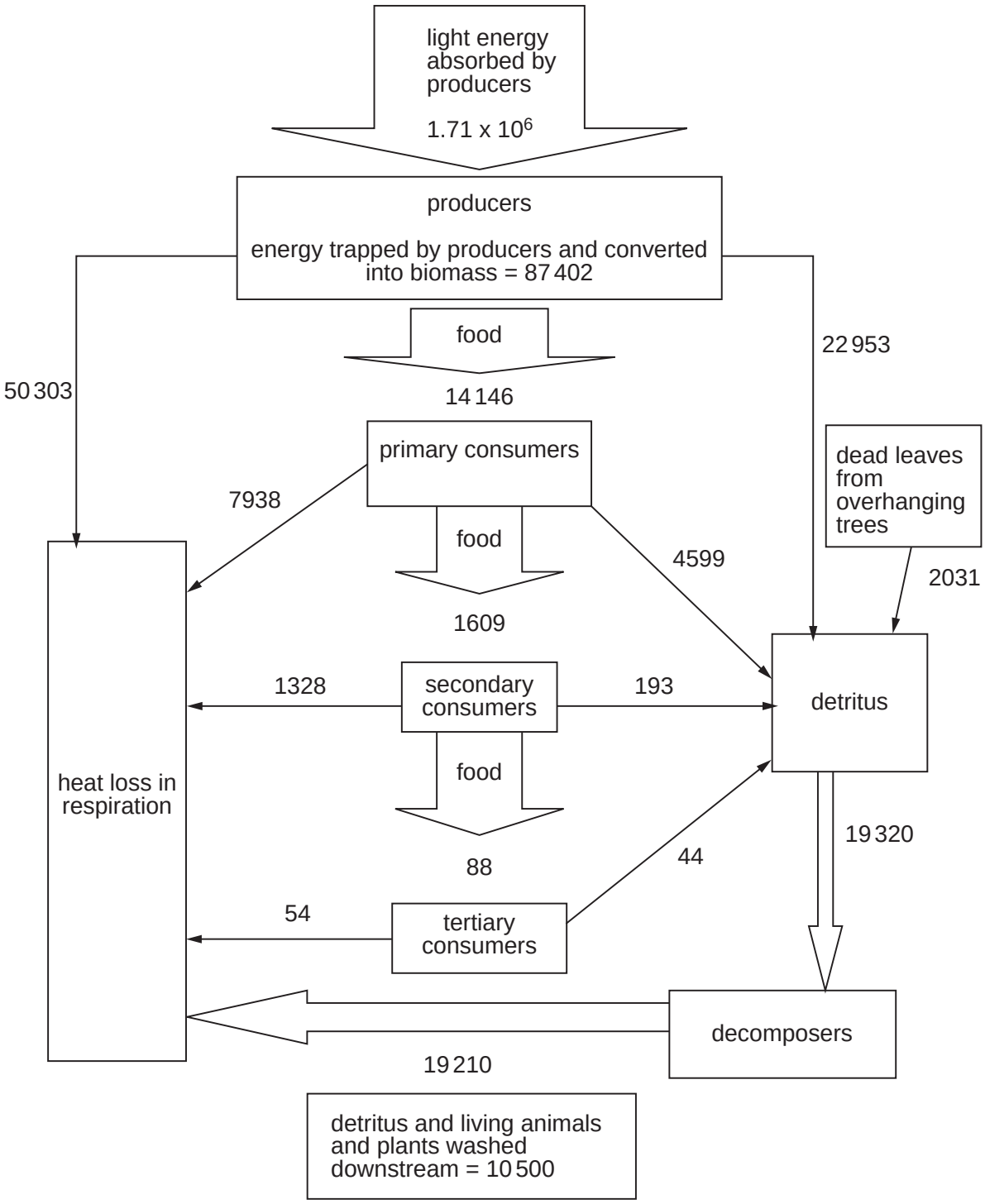

Fig. 6.1

(b) The efficiency of energy transfer between trophic levels is calculated by comparing the energy available to a trophic level with the energy available to the next trophic level. Between secondary and tertiary consumers, this is calculated as follows:

$$\frac{\text{energy available to tertiary consumers}}{\text{energy available to secondary consumers}} \times 100\%$$

Calculate the efficiency of energy transfer between secondary and tertiary consumers in the river ecosystem.

Express your answer to the nearest 0.1%.

Show your working.

Answer .....% [2]

(c) Explain why the energy efficiency between secondary and tertiary consumers is greater than that between producers and primary consumers.

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.....[3]

(d) Describe the roles of decomposers in recycling nitrogen.

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[Total: 9]

4 **(a)** Explain what is meant by the term *community*.

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..... [2]

Fig. 6.1 shows the flow of energy through a woodland. All figures are in kJ m^{-2} per week.

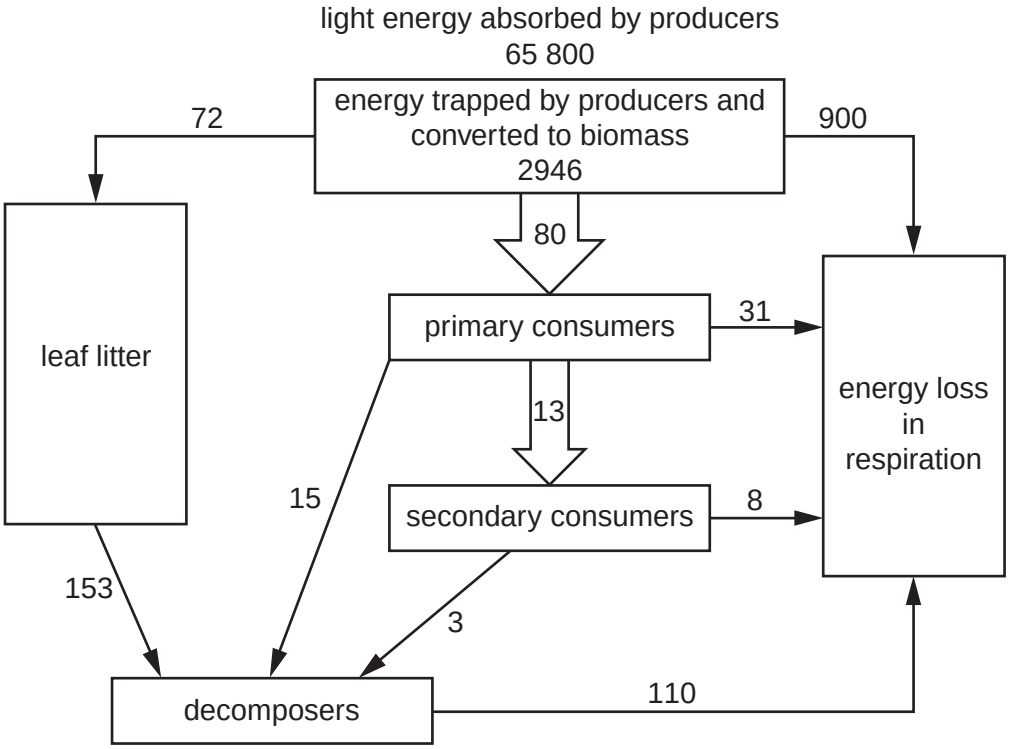

Fig. 6.1

(b) **(i)** Calculate the energy trapped by the producers and converted to biomass as a percentage of the light energy absorbed.

Express your answer to the nearest 0.1%.

Show your working.

Answer ..... % [2]

(ii) Suggest, in terms of energy flow, why there are no tertiary consumers in the woodland.

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..... [2]

(iii) Leaf litter is composed of dead leaves and twigs. The total energy in the leaf litter was 15 899 kJ m^{-2} but only 153 kJ m^{-2} per week is transferred to decomposers. When animal wastes rich in nitrogen were mixed with the leaf litter the energy flow to decomposers increased significantly.

Suggest why the addition of animal wastes rich in nitrogen increased the energy flow to decomposers.

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..... [3]

[Total: 9]

5 The element nitrogen is present in many biological molecules, such as amino acids, proteins and nucleotides.

Fig. 6.1 shows part of the nitrogen cycle.

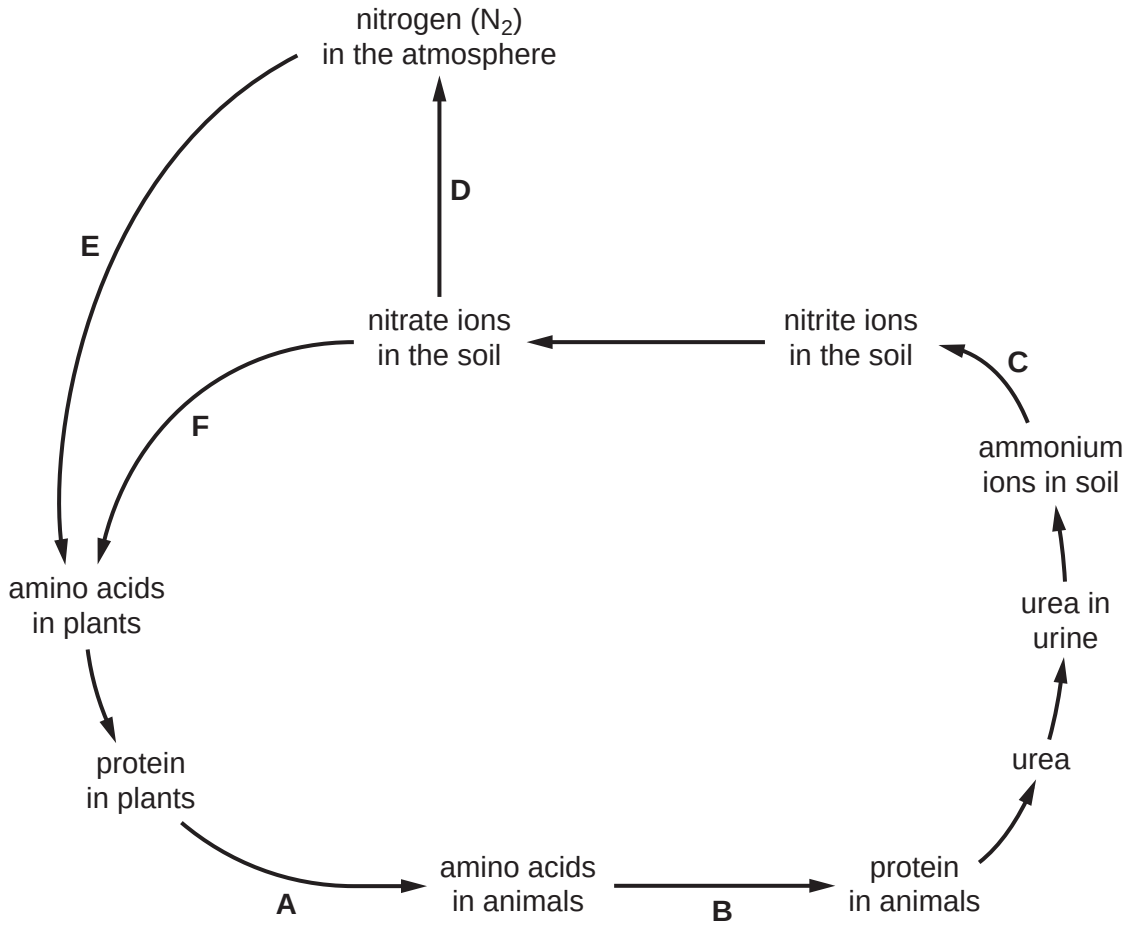

Fig. 6.1

The statements 1 to 10 are processes that occur during the nitrogen cycle.

For each of the stages **B** to **F** shown on Fig. 6.1, select the appropriate description from the list of statements and write it in the box provided.

Write only **one** number in each box.

The first one (**A**) has been selected and completed for you.

1 digestion by primary consumers

2 amino acid synthesis in plants

3 protein synthesis in primary consumers

4 nitrification

5 decomposition

6 nitrogen fixation

7 excretion

8 deamination in primary consumers

9 denitrification

10 deamination by bacteria and fungi

A	1
B	.....
C	.....
D	.....
E	.....
F	.....

[Total: 5]

6 In Central America the Isthmus of Panama closed about 3 million years ago creating a land bridge between North and South America. Snapping shrimps on the Caribbean side of the isthmus appear almost identical to those on the Pacific side, having once been members of the same population. When males and females from different sides of the isthmus were put together they snapped aggressively instead of courting. They had become separate species.

An outline of the region is shown in Fig. 4.1.

Fig. 4.1

(a) The term species is often used in the context of evolution of new species. Explain the meaning of the term **species**.

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..... [2]

(b) State the likely isolating mechanism and type of speciation taking place.

Isolating mechanism .....

Type of speciation ..... [2]

(c) Explain how the process of speciation occurred in the snapping shrimp population.

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..... [4]

[Total: 8]