Biodiversity

Question Paper 4

Level	International A Level
Subject	Biology
Exam Board	CIE
Topic	Biodiversity, classification and conservation
Sub Topic	Biodiversity
Booklet	Theory
Paper Type	Question Paper 4

Time Allowed : **45 minutes**

Score : **/ 37**

Percentage : **/100**

Grade Boundaries:

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

1 The flatback turtle, *Natator depressus*, is an endangered species that nests on northern Australian beaches.

Fig. 1.1 shows a flatback turtle.

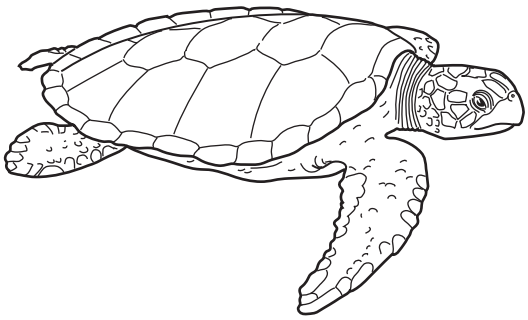

Fig. 1.1

Each female lays approximately 50 eggs per nest, which is a smaller number than all other species of marine turtle. The eggs are buried in the sand and when the hatchlings emerge each has a mass of approximately 43 g. Unlike most marine turtles, flatback turtles spend most of their time in coastal waters. This is where they feed and mate.

Fig. 1.2 shows the numbers of female flatback turtles nesting on a beach in northern Australia between 1993 and 2002.

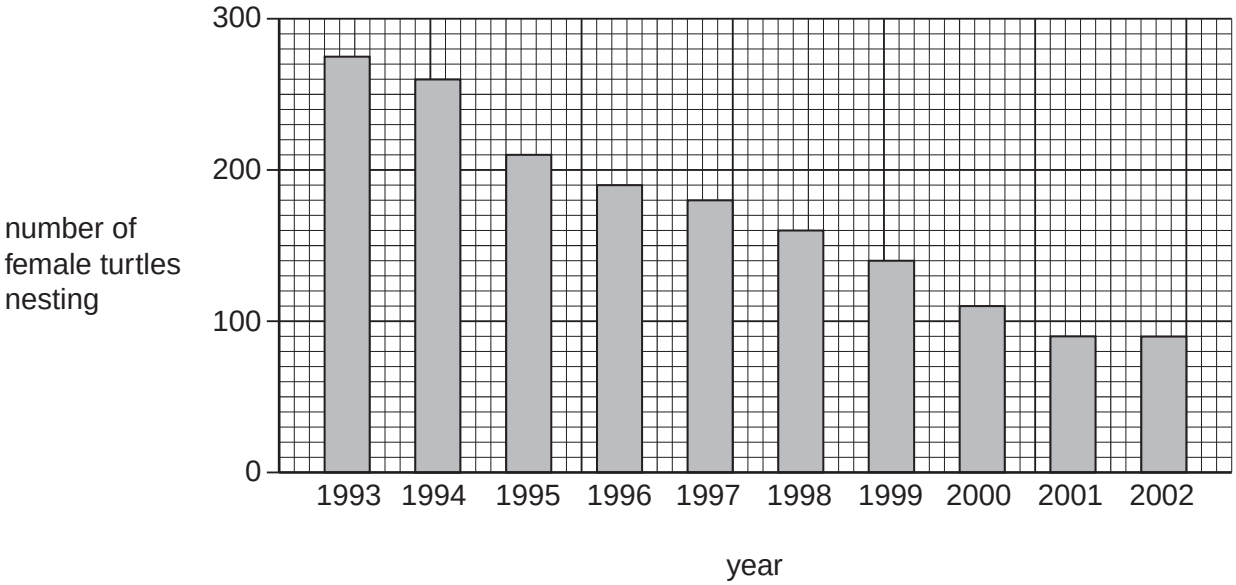

Fig. 1.2

(a) Calculate the mean **rate** of decrease in the numbers of females nesting between 1993 and 2002.

Show all the steps in your calculation.

Answer..... [2]

(b) Suggest ways in which the flatback turtle could be protected.

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..... [5]

[Total: 7]

2 **(a)** Explain what is meant by the term *gene mutation.*

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..... [2]

(b) Rickets is a childhood disorder involving the softening and weakening of bones. It is usually caused by a lack of vitamin D, calcium ions or phosphate ions. A rare form of rickets that cannot be successfully treated with vitamin D therapy is caused by a mutant allele on the X chromosome.

Fig. 6.1 shows a pedigree chart for a family that has a history of this condition.

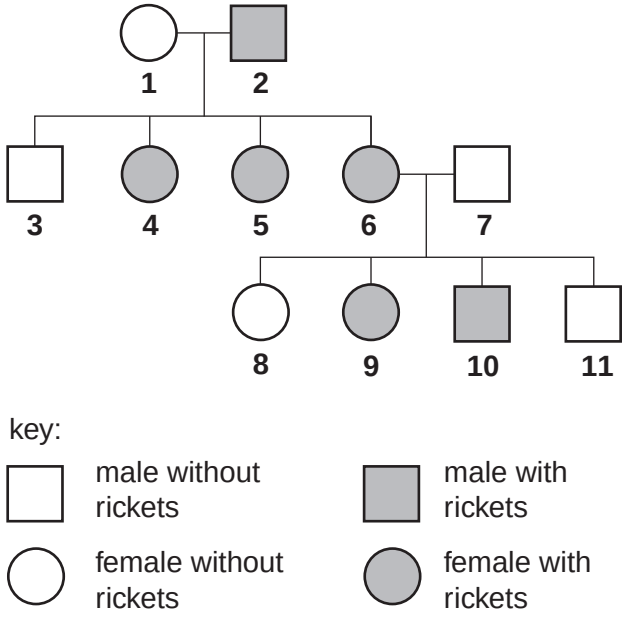

Fig. 6.1

Using the symbols

X^R for the mutant allele on the X chromosome
X^r for the non-mutant allele on the X chromosome

state the genotypes of the following individuals.

1 .....

3 .....

9 .....

10 ..... [4]

(c) The gene in which this mutation occurs codes for a protein found in the cells of the proximal convoluted tubule of the kidney. This protein is involved in phosphate ion transport across membranes.

Suggest why individuals with this mutant allele show symptoms of rickets.

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..... [2]

[Total: 8]

3 **(a)** The table below gives some terms that are used in ecology and their definitions.

Complete the table.

term	definition
ecosystem	all the organisms and the physical factors that influence them in an area, such as a forest
	a place where an organism lives
community	
	role of organism in an ecosystem
	all the organisms of the same species in an ecosystem at the same time

[4]

Fig. 2.1 shows a three-toed sloth, *Bradypus variegatus*, that lives in forest ecosystems in Central America. The sloths living in these forests form part of the community. Sloths feed mainly on the leaves of many different tree species that grow in the under canopy in the forest. These leaves are rich in cellulose, which is digested by bacteria and other microorganisms in the stomachs of sloths. The main predators of sloths are jaguars, harpy eagles, snakes and humans.

Fig. 2.1

(b) With reference to the information above,

(i) state the trophic level occupied by the sloth in the food chain;

.....[1]

(ii) suggest **one** advantage to the sloth of having bacteria and other microorganisms in its stomach;

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.....[1]

(iii) suggest why there are few predators, such as jaguars and harpy eagles, in the forest ecosystem even though there are many producers, such as trees.

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.....[3]

[Total: 9]

4 Fig. 6.1 shows some feeding relationships in an Arctic ecosystem.

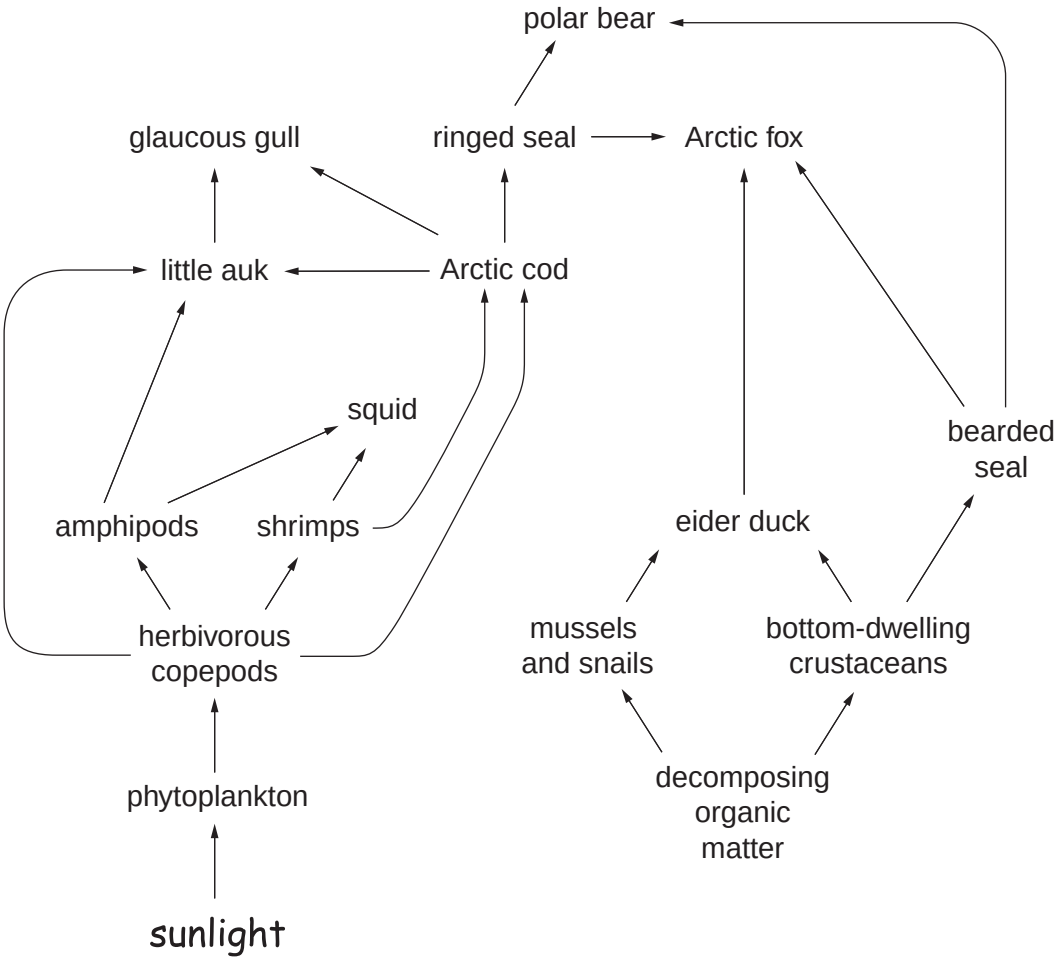

Fig. 6.1

(a) Using the information shown in Fig. 6.1,

(i) name **two** organisms that are feeding as secondary consumers;

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..... [1]

(ii) explain why it is difficult to assign some organisms to trophic levels.

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..... [2]

(b) The efficiency of energy transfer through a trophic level is calculated by comparing the energy available to that trophic level with the energy available to the next trophic level.

It has been estimated that the efficiency of energy transfer by herbivorous copepods is about 17%.

State two factors that are likely to influence the efficiency of energy transfer by herbivorous copepods.

1 .....

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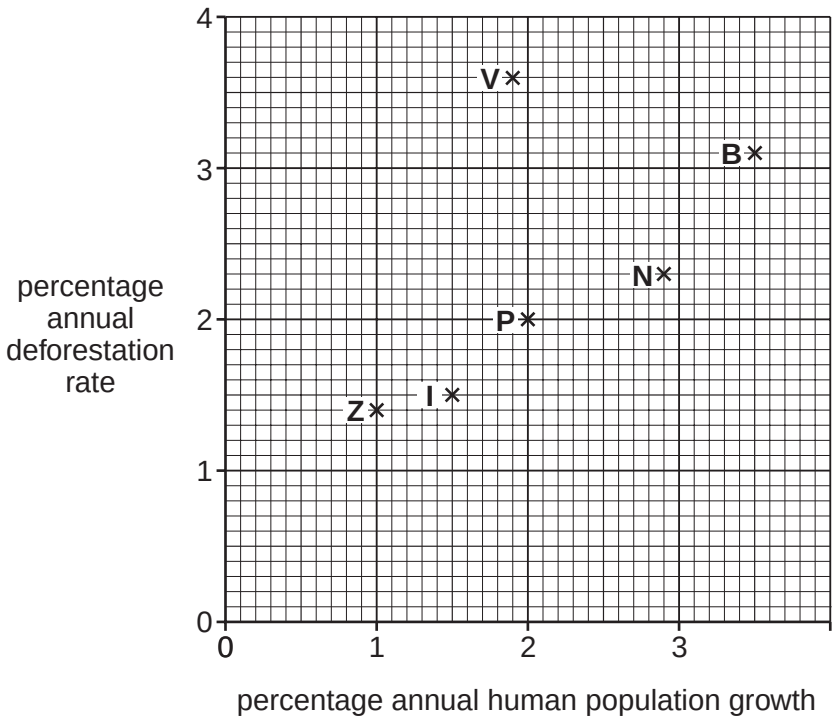
2 .....

..... [2]

[Total: 5]

5 **(a)** Fig. 1.1 shows the relationship between annual deforestation rates and annual human population growth for six countries.



B – Burundi
I – Indonesia
N – Nigeria
P – Philippines
V – Vietnam
Z – Zimbabwe

Fig. 1.1

Describe the relationship shown in Fig. 1.1.

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.....[2]

(b) Over half of the species of plants and animals comprising the biodiversity of the Earth are thought to exist in tropical rainforests.

(i) Explain the meaning of the term *biodiversity*.

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..... [2]

(ii) Explain the economic reasons for maintaining biodiversity.

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..... [4]

[Total: 8]