

Energy

Question Paper 2

Level	International A Level
Subject	Biology
Exam Board	CIE
Topic	Energy and respiration
Sub Topic	Energy
Booklet	Theory
Paper Type	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 Canavan disease is a non sex-linked inherited condition that causes progressive damage to neurones of the brain. Symptoms of the condition include a loss of motor skills and mental retardation. The symptoms appear in early infancy and many children with this condition die by the age of four years.

People with Canavan disease lack an enzyme called aspartoacylase which breaks down N-acetyl aspartate. The build up of N-acetyl aspartate can interfere with the formation of the myelin sheath, particularly in neurones of the brain.

- (a) Enzymes such as aspartoacylase display specificity.

Outline what is meant by *specificity* of an enzyme.

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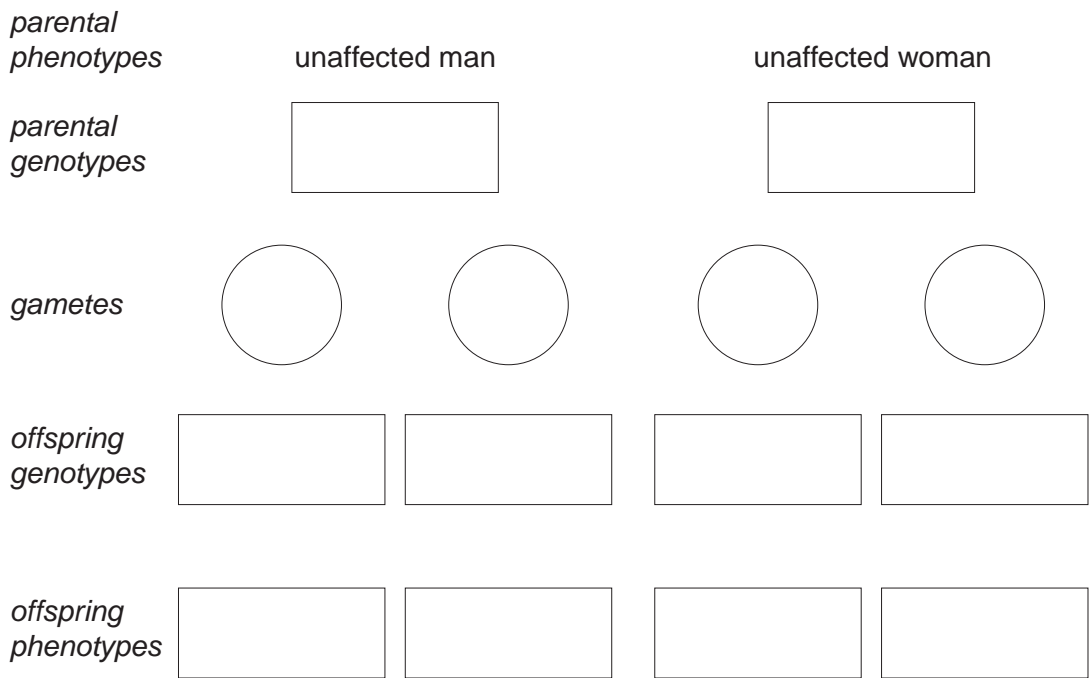
..... [2]

- (b) Complete the genetic diagram below to show how an unaffected man and an unaffected woman could produce a child with Canavan disease.

key to symbols

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[3]

(c) Explain the importance of the myelin sheath in the functioning of a neurone.

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..... [3]

[Total: 8]

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

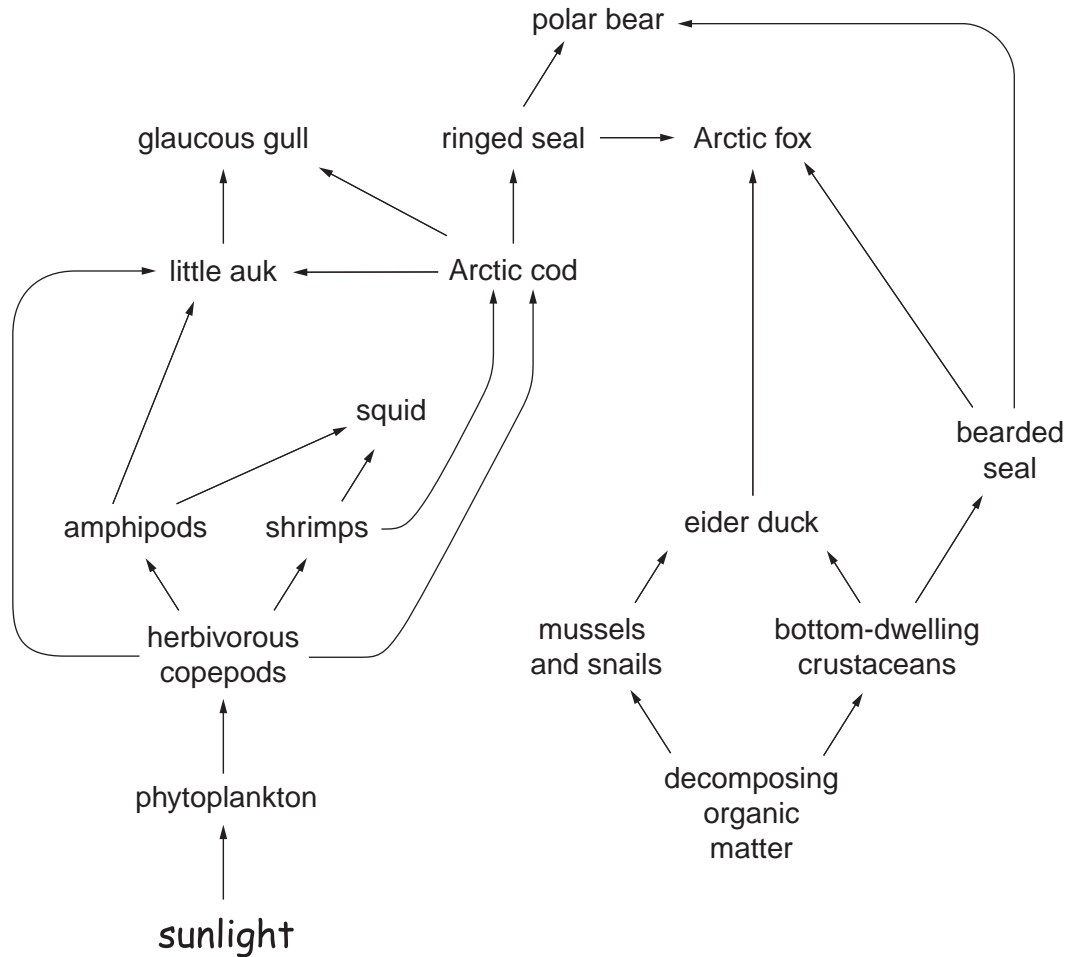


Fig. 6.1

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

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

.....
 [1]

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

.....

 [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]

- 3 The eelgrass, *Zostera*, is a marine plant that forms dense vegetation in shallow coastal waters. The primary consumers in this ecosystem eat the eelgrass and the photosynthetic algae that grow on its surface.

Fig. 5.1 shows the flow of energy through an eelgrass ecosystem. The figures in circles represent the energy transfer in $\text{kJ m}^{-2} \text{yr}^{-1}$.

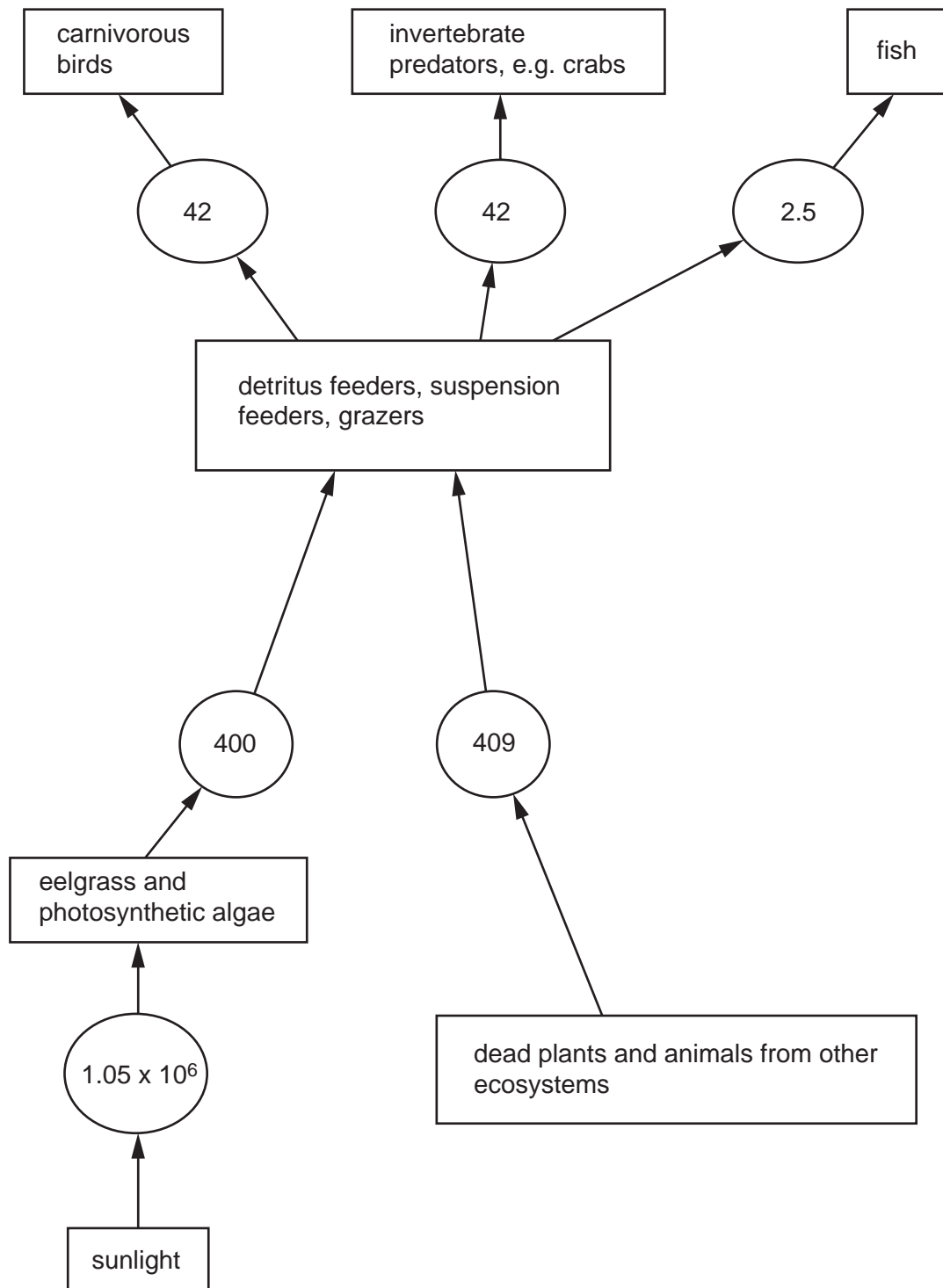


Fig. 5.1

- (a) Calculate the percentage of energy transferred from primary consumers to the secondary consumers in the ecosystem shown in Fig. 5.1. Show your working and express your answer to the nearest whole number.

Answer [2]

- (b) Explain why little of the energy present in producers is transferred to the secondary consumers.

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- (c) Dead plants contain nitrogen in the form of proteins. These are decomposed by bacteria.

Outline how bacteria convert nitrogen in these proteins to a form that may be taken up by living plants.

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..... [2]

[Total: 8]

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5 Fig. 2.1 shows the flow of energy through an ecosystem.

All the figures are in $\text{kJ m}^{-2} \text{year}^{-1}$.

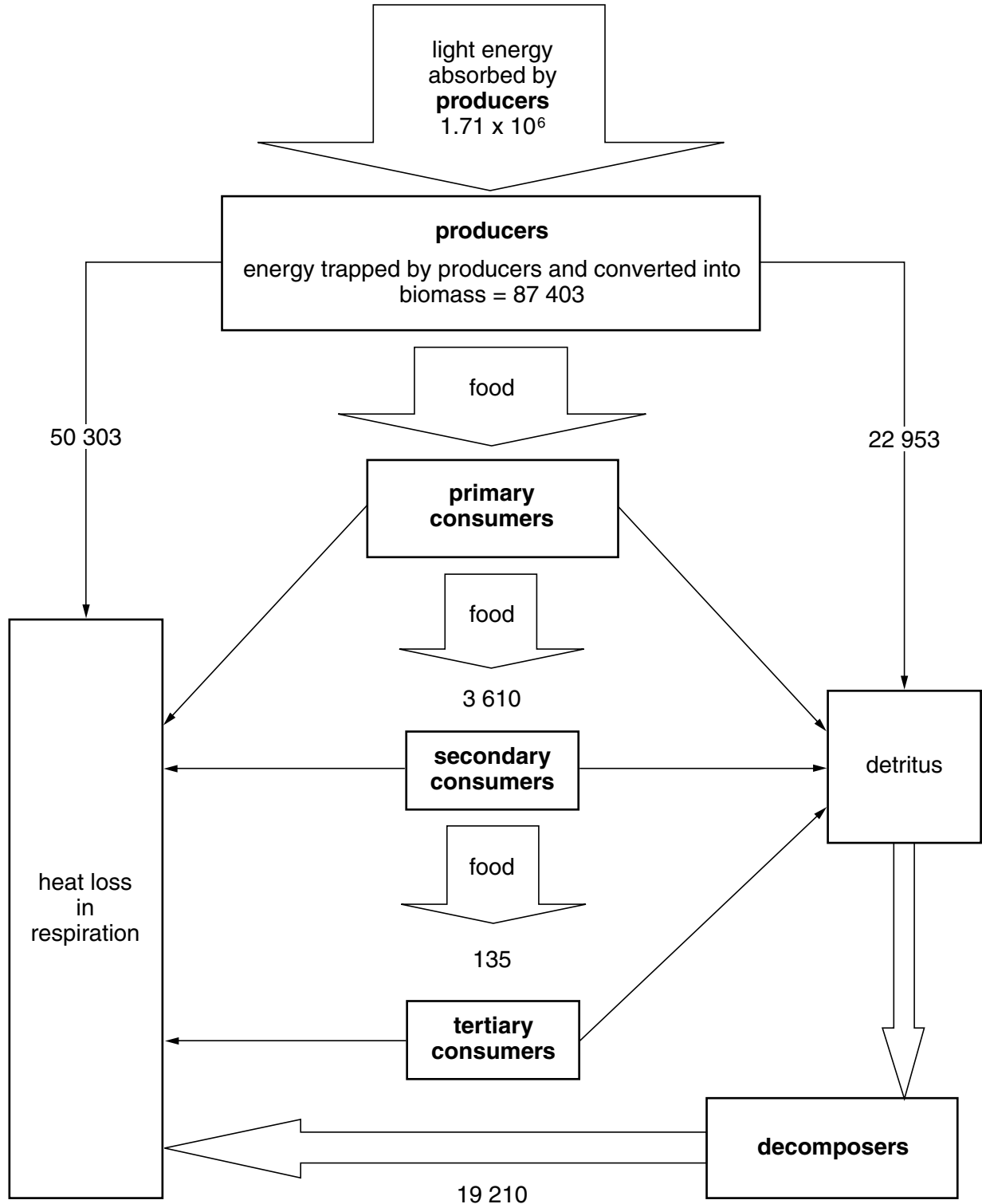


Fig. 2.1

- (a) Calculate how much energy is available to the primary consumers in this ecosystem.

.....[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.

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

Use the formula above to calculate the efficiency of energy transfer between the secondary consumers and the tertiary consumers in this ecosystem.

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.....[1]

- (c) In some food webs, individual consumer species feed at different trophic levels.

With reference to Fig. 2.1, explain an advantage of this for these consumer species.

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- (d) Explain the role of decomposers in the cycling of carbon and nitrogen in ecosystems.

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.....[4]

[Total: 8]