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| Centre Number | Candidate Number | Name |
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UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

BIOLOGY

0610/02

Paper 2

May/June 2005

1 hour 15 minutes

Candidates answer on the Question Paper.
No additional materials are required.

READ THESE INSTRUCTIONS FIRST

Write your Centre number, candidate number and name in the spaces provided at the top of this page.
Write in dark blue or black pen in the spaces provided on the Question Paper.
You may use a soft pencil for any diagrams, graphs or rough working.
Do not use staples, paper clips, highlighters, glue or correction fluid.

Answer **all** questions.
The number of marks is given in brackets [] at the end of each question or part question.

| FOR EXAMINER'S USE | |
|--------------------|--|
| 1 | |
| 2 | |
| 3 | |
| 4 | |
| 5 | |
| 6 | |
| 7 | |
| 8 | |
| 9 | |
| TOTAL | |

If you have been given a label, look at the details. If any details are incorrect or missing, please fill in your correct details in the space given at the top of this page.

Stick your personal label here, if provided.

This document consists of **15** printed pages and **1** blank page.



Answer **all** the questions.

1 Fig. 1.1 shows a mayfly nymph (a larva) that lives in water.

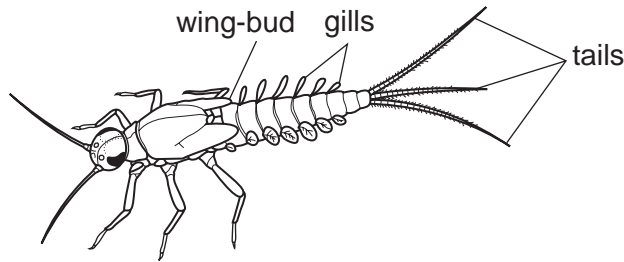


Fig. 1.1

(a) (i) List two features, visible in Fig. 1.1, that show this is an insect.

1.
2. [2]

(ii) What special adaptation does the insect shown in Fig. 1.1 have that allows it to live in water?

..... [1]

(b) Fig 1.2 shows five mayfly nymphs.

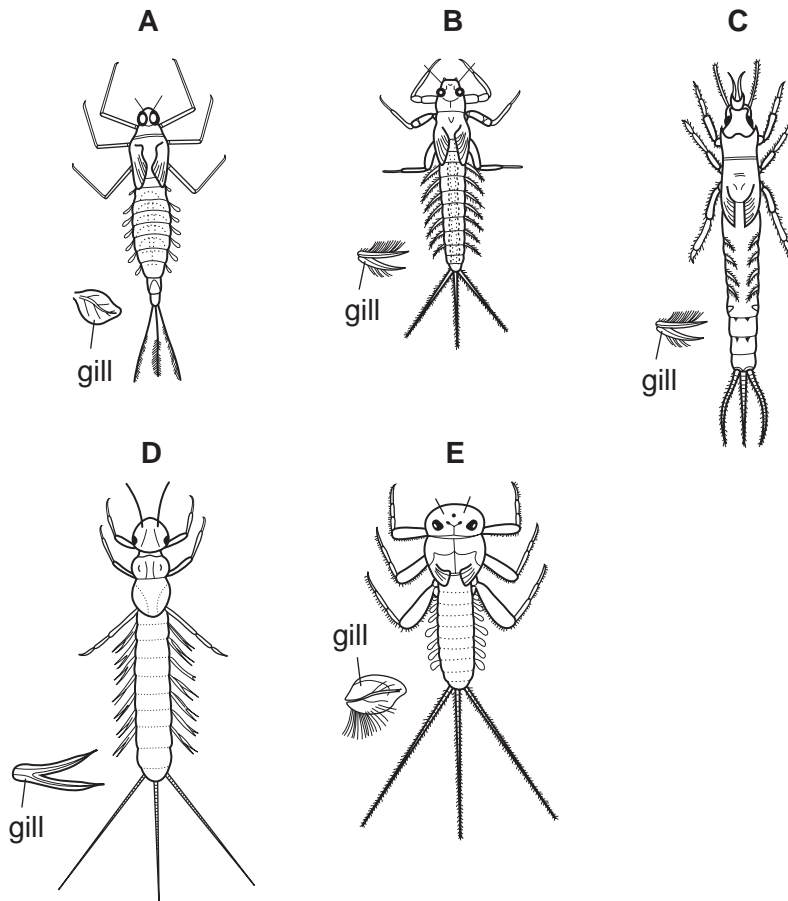


Fig.1.2

Use the key below to identify the species of each mayfly.

| | species |
|---|--|
| 1 Rear pair of legs point towards tails _____ go to 2 Rear pair of legs point forwards or sideways _____ go to 3 | |
| 2 Gills project sideways from body Gills folded over body | <i>Paraleptophlebia</i> <i>Ephemera</i> |
| 3 Each gill a single flat plate _____ go to 4 Each gill divided into two strands | <i>Potomanthus</i> |
| 4 Tails "feather" like in shape Tails "needle" shaped | <i>Centroptilum</i> <i>Ecdyonurus</i> |

Write the diagram letter of each of the species in the correct box of Table 1.1.

Table 1.1

| species | diagram letter |
|-------------------------|----------------|
| <i>Centroptilum</i> | |
| <i>Ecdyonurus</i> | |
| <i>Ephemera</i> | |
| <i>Paraleptophlebia</i> | |
| <i>Potomanthus</i> | |

[4]

[Total: 7]

- 2 A large number of seeds were germinated on damp sand. Random samples of 10 seedlings were taken every two days. The fresh mass and the dry mass of each sample were measured and are shown in the graph, Fig. 2.1.

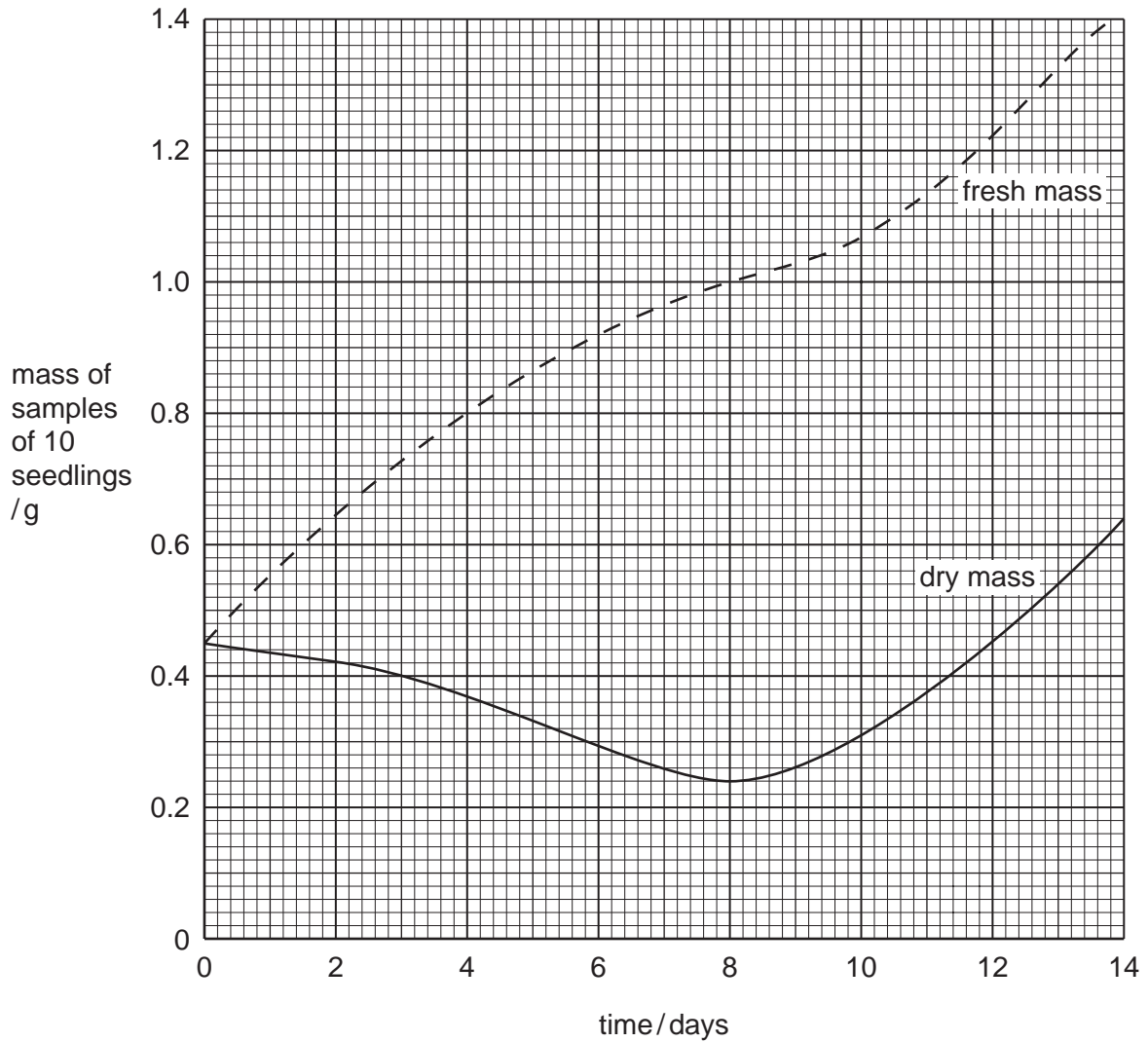


Fig. 2.1

- (a) (i) State why the fresh mass and dry mass of a seedling are different.

.....
 [1]

- (ii) Fresh mass is not reliable as a measure of plant growth.

Suggest why dry mass is a more reliable measure of plant growth.

.....
 [1]

(iii) Explain why 10 seedlings, rather than 1, were used for each sample.

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

(b) (i) Describe what happens to the **fresh** mass of the seedlings in the first 2 days after the seeds were set to germinate.

.....
..... [2]

(ii) Suggest a reason for this change in mass.

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

(c) (i) Describe what happens to the **dry** mass of the seedlings during the first 8 days.

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

(ii) Suggest a reason for this change in mass.

.....
..... [2]

(d) Suggest which processes begin in the living seed during the early stages of germination.

.....
.....
.....
..... [4]

[Total: 13]

3 A cheetah is a predator that feeds on small antelopes. When chasing its prey, the cheetah runs very fast but can only keep this up for a short time.

(a) (i) Name the hormone that would be released in large quantities into the cheetah's blood to prepare it for the chase.

..... [1]

(ii) State two ways in which this hormone can help to provide extra energy for the cheetah to run very fast.

1.

.....

2.

..... [2]

(b) To run very fast the cheetah releases energy by both aerobic and anaerobic respiration.

(i) Complete the equation below to show anaerobic respiration in the cheetah's muscles.

..... → + energy [1]

(ii) State two disadvantages of anaerobic respiration.

1.

.....

2.

..... [2]

- (c) Fig. 3.1 is a graph of the volume of air flowing into and out of the lungs of a human while breathing at rest.

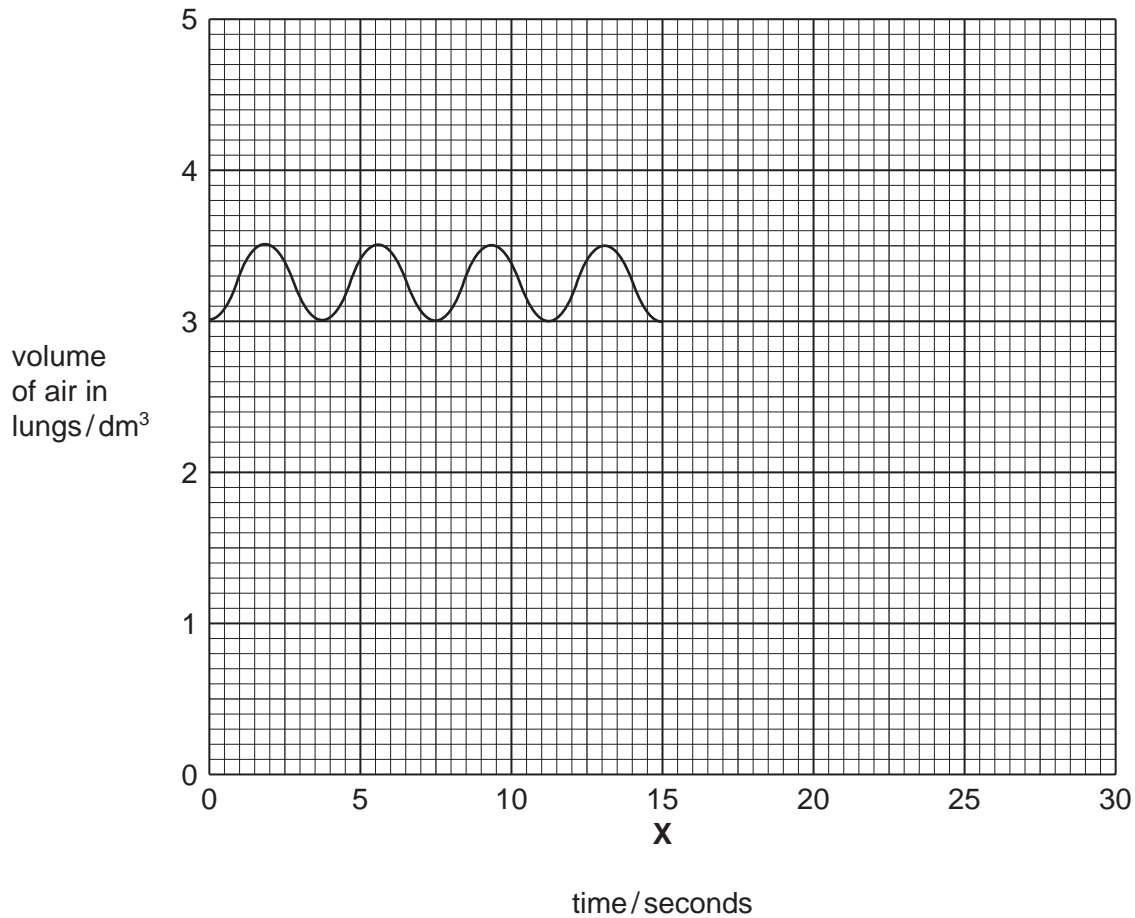


Fig. 3.1

- (i) State how many breaths are inhaled in 15 seconds.
 [1]
- (ii) State the volume of air breathed in during each breath.
 [1]
- (iii) Calculate the volume of air breathed in during one minute.
 Show your working.
 [2]
- (iv) At time **X** the person began to exercise. Sketch on the graph five more breaths for this person during this exercise.
 [2]

[Total: 12]

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4 The temperature of mammals is normally kept fairly constant.

(a) Explain how each of the following processes helps to keep the body temperature constant.

(i) *sweating*

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

(ii) *vasoconstriction*

.....
.....
.....
..... [4]

(b) Explain the value to mammals of maintaining a constant body temperature.

.....
.....
..... [2]

[Total: 9]

5 (a) Select the correct term from the list below and write it in the box next to its description.

- allele dominant gene genotype heterozygous
homozygous phenotype recessive

| description | term |
|---|------|
| a form of a gene that always has its effect when it is present | |
| a form of a gene that codes for one of a pair of contrasting features | |
| an organism having two different forms of a gene for a particular feature | |
| the alleles that an organism has in its chromosomes | |

[4]

(b) Two red flowered plants were crossed. The seeds produced were germinated and grew into 62 white flowered plants and 188 red flowered plants.

(i) Which flower colour is controlled by the recessive form of the gene?

..... [1]

(ii) Using the symbols **R** and **r**, construct a genetic diagram to explain the results of this cross.

[4]

- (iii) One of the white flowered offspring was crossed with a red flowered offspring. Predict the two possible ratios of red and white flowered plants that their seeds would produce.

1.
2. [2]

[Total: 11]

6 Fig. 6.1 shows a food web from the Antarctic.

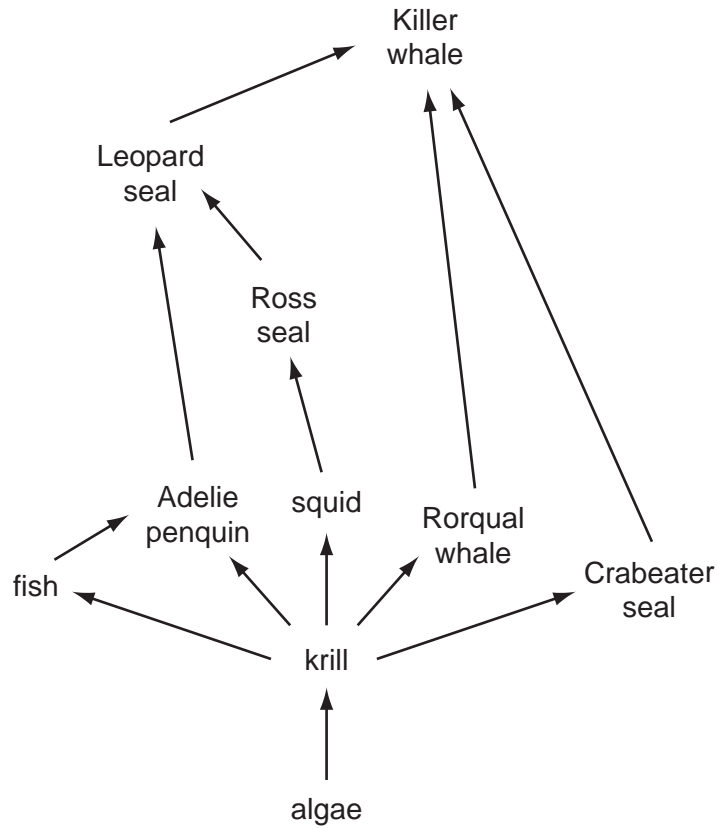


Fig. 6.1

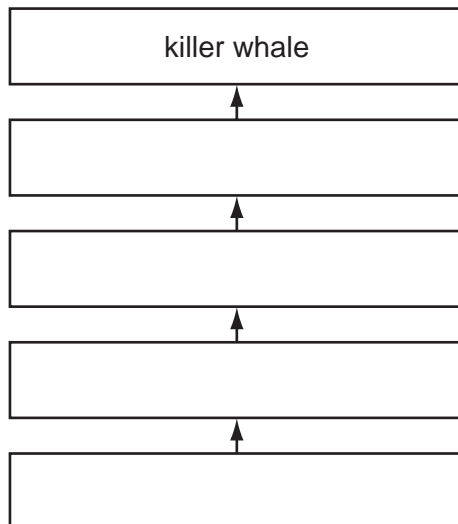
(a) (i) State the original source of energy for this food web.

..... [1]

(ii) Name an organism in this food web that is both a secondary and a tertiary consumer.

..... [1]

(b) Write in the names of organisms from Fig. 6.1 to form a complete food chain.



[1]

(c) There is concern that pollution of the environment may change the breeding grounds of the Adelie penguin.

State and explain the effect this might have on the populations of the Leopard seal and the Ross seal.

Leopard seal

.....

.....

Ross seal

.....

..... [4]

[Total: 7]

7 (a) Fibre in the human diet contains a lot of cellulose that humans cannot digest.

(i) State two advantages to humans of including fibre in the diet.

1

.....

2

..... [2]

(ii) Suggest which level in a food chain has organisms that have a means of digesting cellulose.

..... [1]

(iii) Name the form of energy that is present in cellulose.

..... [1]

(iv) What is cellulose used for in plants?

..... [1]

(b) Micronutrients are components of the diet that are only needed in very small quantities.

Name two micronutrients that are essential for the healthy development of bones and teeth.

1

2

[Total: 7]

8 Fig. 8.1 shows a diagram of a section through the heart.

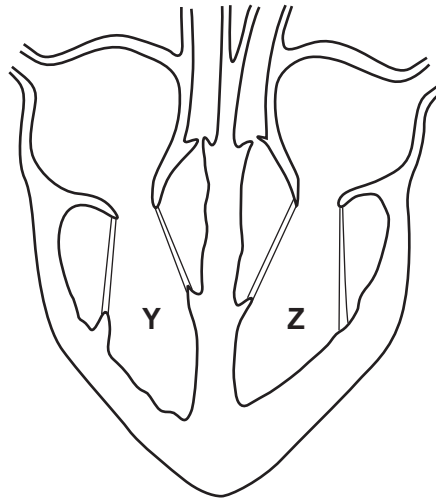


Fig. 8.1

(a) On Fig. 8.1:

- (i) label an atrium; [1]
- (ii) label the pulmonary vein; [1]
- (iii) shade in the chambers that contain deoxygenated blood. [1]

(b) Explain why the wall around chamber Z needs to be thicker than that around chamber Y.

.....

.....

..... [2]

(c) Name the blood vessel that delivers blood to the muscles of the heart.

..... [1]

(d) State **two** preventive actions a person could take to reduce the chance of a heart attack.

.....

.....

.....

..... [2]

[Total: 8]

- 9 Fig. 9.1 shows changes in the population of rabbits after a few of them were released into a new habitat.

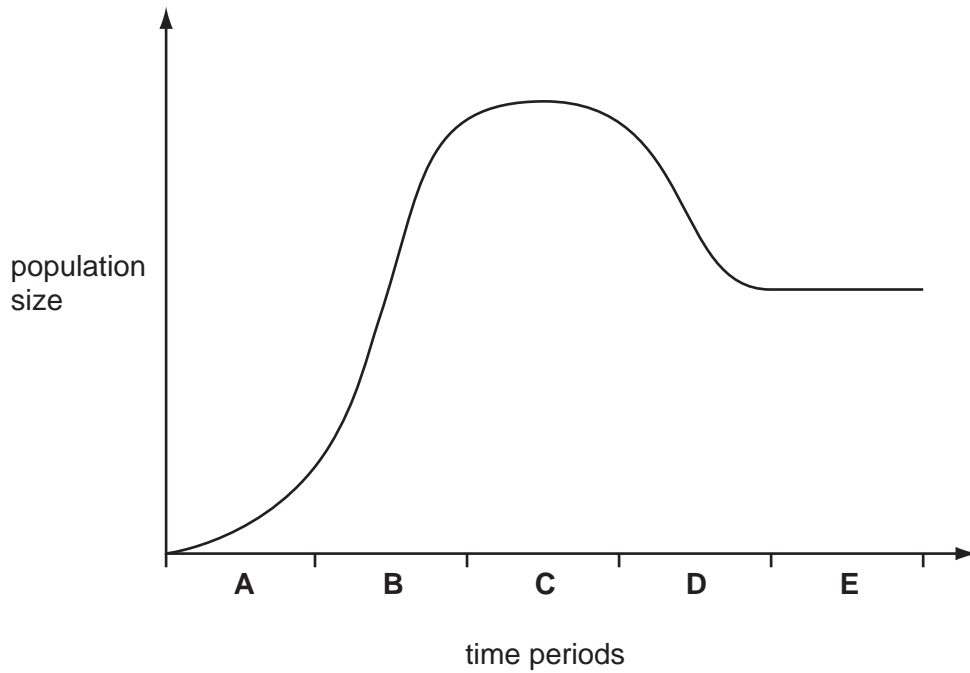


Fig. 9.1

- (a) (i) On the graph mark with an **X** a point when the birth rate is much greater than the death rate. [1]
- (ii) On the graph mark with an **Z** a point when the birth rate and the death rate are the same. [1]
- (b) During time period **D** there is a decrease in the size of the population.

Outline the factors that may have caused this decrease in population.

.....

.....

.....

.....

.....

.....

.....

..... [4]

[Total: 6]

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