

Paper Reference(s)

7040/01

London Examinations GCE

Biology

Ordinary Level

Paper 1

Monday 12 January 2004 – Morning

Time: 2 hours

Materials required for examination

Answer book (AB12)

Items included with question papers

Nil

Instructions to Candidates

Answer BOTH questions from Section A and any THREE questions from Section B.

In the boxes on the answer book, write the name of the examining body (London Examinations), your centre number, candidate number, the subject title (Biology), the paper reference (7040/01), your surname, other names and signature.

Answer your questions in the Answer book. Make sure your answers to parts of questions are clearly numbered. Use additional answer sheets if necessary.

Information for Candidates

Calculators may be used.

The total mark for this paper is 100.

The mark allocation is indicated at the end of each question.

The marks for parts of questions are shown in round brackets: e.g. (2).

This paper has seven questions. There are no blank pages.

Advice to Candidates

Write your answers neatly and in good English.

In calculations, show **all** the steps in your working.

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 **London
Examinations**
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SECTION A

Answer BOTH questions

1. Read the passage below. Use the information in the passage and your own knowledge to answer the questions that follow.

The Cane Toad

Cane toads are also known as 'giant toads' and are native to North, Central and South America. They can weigh up to 2.5 kg and have a length of 26 cm. They are very poisonous. A number of highly toxic substances have been identified in cane toads. These toxins are produced in the 'warted' skin and in two glands on the head. Toxins are also found in the toad's muscle, bones and body organs and in their eggs and tadpoles. Cane toads pose little threat to humans unless they are eaten or their skin secretions come in contact with a person's eyes or mouth. These toxins do, however, make cane toads a potential threat to domestic animals and to some wild animals.

In 1935 cane toads were introduced into Australia. They were released in the territory of Queensland as a biological control for the cane beetle, which is a pest that feeds on and destroys sugar cane crops. Scientists thought that the cane toads would destroy the cane beetles. Unfortunately the cane toads have failed to control the cane beetles. Worse still, the cane toads have multiplied and spread to other areas of the country and have themselves become a pest.

In Australia, many native species die if they eat the adult cane toads or their eggs or tadpoles. Only a few species are able to prey on them safely. These include the snapping turtle, the freshwater snake, crocodiles and the water rat. However, the full extent of the impact of the cane toad on native wildlife is not fully understood. This is because it is not easy to separate their impact on the ecosystem from the impact of other factors, such as increasing human population, clearance of vegetation, pollution of waterways and the spread of introduced plant and animal pests.

(Adapted from Queensland Museum Explorer 2002)

- (a) (i) Explain what is meant by the term 'biological control' (line 9). (2)
- (ii) Describe **one** example of biological control other than cane toads. (2)
- (b) (i) Suggest **one** advantage to the cane toad of releasing a toxin (line 3). (1)
- (ii) Suggest how the toxin produced in the skin reaches other body organs (line 5). (1)
- (c) 'The full extent of the impact of the cane toad on native wildlife is not fully understood. This is because it is not easy to separate their impact on the ecosystem from the impact of other factors' (lines 15 and 16).

Explain how clearance of vegetation might also have an impact on the ecosystem.

(3)

(d) Amphibians such as the cane toad show different forms in their life cycle. Insects also show different forms in their life cycle.

(i) Name the process by which insects change from one form to another in their life cycle. (1)

(ii) Name the **three** stages in the life cycle of the cane toad. (3)

(e) State **two** advantages of biological control over chemical control of pests. (2)

(Total 15 marks)

2. The table below shows biological measurements for a normal male student before and after a programme of fitness training. The training programme lasted for twelve months.

The table also includes data for a male athlete of international standard.

| Measurement | Normal male student | | International athlete |
|--|---------------------|----------------|-----------------------|
| | Before training | After training | |
| Heart rate at rest in beats per minute | 72 | 58 | 36 |
| Heart volume in cm ³ | 750 | 820 | 1200 |
| Ventilation rate at rest in breaths per minute | 14 | 12 | 12 |
| Ventilation rate during exercise in breaths per minute | 40 | 45 | 55 |
| Lung capacity in cm ³ | 7200 | 7200 | 7400 |

- (a) (i) Calculate the percentage change in heart rate for the normal male student after twelve months training. Show your working. (3)
- (ii) Suggest a reason for the change in heart rate for the normal male student after twelve months training. (1)
- (b) What are the effects of training on the heart volume and on the lung capacity of the normal male student? (2)
- (c) Using the data provided in the table, suggest why the international athlete is likely to perform better than the normal male student in a long distance running race, such as a marathon. (4)

(Total 10 marks)

TOTAL FOR SECTION A: 25 MARKS

SECTION B

Answer any **THREE** questions

3. (a) Name **three** hormones involved in the menstrual cycle of a woman. For each hormone state **two** effects. (9)
- (b) (i) Name the hormone responsible for producing secondary sexual characteristics in a male. (1)
- (ii) State **two** male secondary sexual characteristics. (2)
- (c) GH is a hormone that helps animals grow. Design an investigation that research workers could do to find out how effective GH is at improving the growth of cows. (6)
- (d) (i) Some people need a regular injection of a hormone to help control their blood glucose level. Name the hormone and explain why the injection is required. (3)
- (ii) Explain the problems that occur in a normal person if blood glucose levels become too low and if they become too high. (4)

(Total 25 marks)

4. (a) Draw a large labelled diagram of an insect pollinated flower. (7)
- (b) Describe the events that take place in the flower that lead to formation of the seed. (Details of germination are not required.) (8)
- (c) Describe a simple experiment you could carry out to investigate the effect of temperature on the germination rate of barley seeds. (6)
- (d) Name **two** conditions, other than suitable temperature, necessary for germination to occur. For each condition you give explain why it is required for germination. (4)

(Total 25 marks)

5. (a) (i) Plants obtain their food by photosynthesis. Name **two** substances required by plants for photosynthesis. (2)
- (ii) Suggest an explanation for the fact that glasshouse crops grow at a faster rate than crops grown outside. (3)
- (b) Describe a simple controlled experiment you could carry out to show that light intensity alters the rate of photosynthesis. You should include the results you might expect. (7)
- (c) Humans obtain their food by feeding on other organisms.

The following molecules are part of the human diet. State the **elements** present in **each** molecule.

- (i) Carbohydrate (1)
- (ii) Lipid (1)
- (iii) Protein (1)
- (d) Describe the series of events that take place in the body after eating some fatty food until the absorption of its products into the body cells. (10)

(Total 25 marks)

6. (a) List the terms used to describe the first, second, third and fourth trophic levels of a typical food web. (4)
- (b) The relationship between a mould fungus feeding on a piece of bread is described as being saprophytic.
- (i) Explain the importance of saprophytic organisms in the environment. (3)
- (ii) Describe an experiment you could carry out to see how air temperature affects the growth of mould fungus on bread. (6)
- (c) "Mutualism" is a term used to indicate a type of relationship between two different species. Explain how each of the following are examples of mutualism.
- (i) The bacteria found in the gut of sheep. (5)
- (ii) The bacteria found in the root nodules of leguminous plants. (3)
- (d) Parasitism is a term used to indicate a type of relationship between two different species. Use a named example to explain what parasitism is. (4)

(Total 25 marks)

7. (a) Substances move into and out of cells in different ways. Osmosis is a special case of diffusion.
- (i) Give **two** ways that osmosis is similar to other kinds of diffusion. (2)
 - (ii) Give **two** ways that osmosis is different from other kinds of diffusion. (2)
- (b) Describe the role of human blood in each of the following.
- (i) Transport (6)
 - (ii) Defence against infection (5)
- (c) Explain why unicellular organisms such as *Amoeba* do not need a transport system. (3)
- (d) Describe a simple experiment you could carry out to find out if water loss from a leafy shoot is affected by changing the humidity of the surrounding atmosphere. You should include the results you might expect. (7)

(Total 25 marks)

TOTAL FOR SECTION B: 75 MARKS

END