

Paper Reference(s)

7040/01

London Examinations GCE

Biology

Ordinary Level

Paper 1

Monday 13 January 2003 – 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 supplementary 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. Pages 7 and 8 are blank.

Advice to Candidates

Write your answers neatly and in good English.

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

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SECTION A

Answer **BOTH** questions

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

Deserts have less than 100 mm of rain annually and sometimes, for several years, may have no rain at all. In some deserts temperatures often exceed 50°C. It is not surprising that very few plants are able to survive in deserts.

5 Typical desert plants are annuals, which are successful because they complete their life cycle in a short period of time. Some of the perennials in the desert have bulbs and remain dormant for most of the year. Other, taller perennials are either succulents, with water stored in thick fleshy leaves or stems, or they may have small, leathery leaves that can be shed in times of drought.

10 Desert plants have a problem. They have to synthesise the carbohydrate they need to survive by combining water and carbon dioxide, using energy from sunlight. But when they open their 'pores' to let in carbon dioxide, they lose water by transpiration. In other environments plants compensate for transpiration by taking water up from the soil as fast as they lose it, but desert plants cannot do this. By limiting the size or number of leaves, desert plants reduce the surface from which water can escape.

15 Some desert plants have long roots which reach water deep down under the soil. Others, such as cacti, have roots in the surface layer of the soil.

Another characteristic of desert vegetation is that plants are widely spaced and this minimises competition. Some plants actually secrete toxins which prevent young plants establishing themselves nearby.

(Adapted from BBC online September 2001)

- (a) Give **two** examples of why it is an advantage for a desert plant to complete its life cycle quickly. (Lines 4 and 5) (2)
- (b) (i) Suggest why broad leaves would be a disadvantage to desert plants. (1)
- (ii) State **one** way it is an advantage and **one** way it is a disadvantage for a plant to shed its leaves in times of drought. (Line 7) (2)
- (c) What name is given to the 'pores' found on the leaves of desert plants? (Line 10) (1)
- (d) Name **two** external factors that can alter the rate of transpiration. For **each** factor, explain how it changes the rate. (4)
- (e) (i) Suggest the advantage to cacti of having roots in the surface layer of the soil. (Line 15). (1)
- (ii) Suggest **two** requirements that desert plants are likely to compete for. (Lines 16 and 17). (2)
- (f) Describe a simple experiment you could carry out to investigate whether cacti produce toxins that prevent the growth of other plants. (4)

(Total 17 marks)

2. The table below shows the populations of 12 countries on three different continents estimated in 1990, and their rate of increase.

Continent	Country	Population (millions)	Rate of increase
Asia	Bangladesh	115	2.5
	China	1120	1.4
	India	853	2.1
	Indonesia	189	1.8
	Pakistan	115	3.0
Europe	France	56	0.4
	Germany	80	0.0
	Italy	58	0.1
	United Kingdom	57	0.2
America	Brazil	150	1.9
	Mexico	89	2.4
	United States of America	251	0.8

(Adapted from Adds, Larkcom and Miller 2001)

- (a) (i) Which country had the highest rate of population increase? (1)
- (ii) How far is the rate of increase in population linked to the continent the country is found in? Give evidence from the table to support your answers. (3)
- (b) (i) Suggest **two** factors that are likely to lead to a high rate of increase in the population of a country. (2)
- (ii) Suggest **two** other factors that are likely to lead to a low rate of increase in the population of a country. (2)

(Total 8 marks)

TOTAL FOR SECTION A: 25 MARKS

SECTION B

Answer any **THREE** questions

3. (a) (i) Give **two** ways that plant nutrition differs from animal nutrition. (2)
- (ii) Write a balanced chemical equation for photosynthesis. (3)
- (b) Variegated leaves have some white and some green areas. Describe an experiment you could do to show that variegated leaves carry out photosynthesis only in the green areas. Describe the results you would expect from your experiment. (6)
- (c) Name **two** external factors that affect the rate of photosynthesis. For each factor, state how it would affect the rate of photosynthesis. (4)
- (d) Describe how the structure of a leaf helps it carry out photosynthesis. For each feature you give, explain how it enables photosynthesis to occur efficiently. (10)

(Total 25 marks)

4. The human skin has an important role in temperature regulation.
- (a) The skin and its blood vessels help to maintain a constant body temperature. Describe how they respond to an **increase** in external temperature. For each change you describe, name the part of the skin responsible and explain how it helps to control the temperature. (9)
- (b) Human responses to stimuli may be voluntary or involuntary. State **two** ways that voluntary responses differ from involuntary responses and give **one** example of each type of response. (4)
- (c) Give **two** functions of each of the following parts of the brain.
- (i) Cerebral hemispheres (2)
- (ii) Cerebellum (2)
- (iii) Medulla oblongata (2)
- (d) Plants respond to changes in the environment. Describe a simple controlled experiment you could carry out to show the effect of unidirectional light (light coming from one side) on a growing shoot. Describe the results you would expect from your experiment. (6)

(Total 25 marks)

5. (a) A number of factors can affect the distribution of organisms in the environment. Physical factors are known as abiotic factors.
- (i) Suggest how each of the following abiotic factors might influence organisms in a habitat you have studied.
- 1 Temperature
- 2 Light
- (6)
- (ii) Name **one** other abiotic factor and suggest how this factor might influence organisms in a habitat.
- (2)
- (b) Describe the harmful effects on an ecosystem of each of the following.
- (i) Deforestation
- (4)
- (ii) Overgrazing
- (3)
- (c) Give **one** example of a pollutant of water and describe its effects.
- (3)
- (d) (i) Explain what is meant by biological control, giving **one** example to illustrate your answer.
- (3)
- (ii) State **two** advantages of using biological control rather than chemical control.
- (2)
- (iii) State **two** disadvantages of using biological control.
- (2)
- (Total 25 marks)
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6. (a) State **three** conditions required for germination of a seed.
- (3)
- (b) Describe a controlled experiment you could carry out to show that germinating seeds carry out respiration.
- (6)
- (c) Give an account of the changes that take place in a seed during germination.
- (7)
- (d) (i) Describe how, in the human embryo, nutrients are supplied and waste products are removed.
- (7)
- (ii) How is the embryo protected from physical damage?
- (2)
- (Total 25 marks)
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7. (a) (i) Describe how, after a meal, starch is digested into glucose and how this is absorbed in the body. (8)
- (ii) Explain why bile is important in the digestion of fat. (2)
- (b) Describe the following types of nutrition and give **one** example of each.
- (i) Parasitism (3)
- (ii) Saprophytism (3)
- (iii) Mutualism (3)
- (c) Describe a controlled experiment you could carry out to show that magnesium is required for healthy plant growth. Give the results you would expect from your experiment. (6)

(Total 25 marks)

TOTAL FOR SECTION B: 75 MARKS

END