Paper Reference(s)

7040/01

London Examinations GCE

Biology

Ordinary Level

Paper 1

Monday 22 May 2006 – Morning

Time: 2 hours

Materials required for examination	Items included with question papers
Answer book (AB12)	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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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.

Can viruses be used as cures?

Antibiotics are chemical substances that kill bacteria or prevent them from reproducing. Certain fungi secrete antibiotics when competing with bacteria for food. Doctors give these antibiotics to people who have bacterial infections or diseases.

Unfortunately, some bacteria have become resistant to many of the antibiotics. An example is the MRSA bacterium. Now the only antibiotic that kills the MRSA bacterium is vancomycin. In future many people will die if the MRSA bacterium becomes resistant to vancomycin.

However, there is hope in the form of viruses. Normally, viruses attack cells of other organisms and reproduce inside these cells. This causes illnesses such as influenza, measles and AIDS in humans. However, some viruses attack only bacteria. These viruses are called bacteriophages (phages).

Wounds infected with bacteria have been treated with phages. These phages have been put into bandages and applied to the open wounds. The wounds healed successfully. The type of bacteria causing the infection must be known before applying the bandage, because phages are specific in that different phages attack different bacteria. Once their job is completed the phages are removed from the wound by blood cells that normally protect against infection.

Phage treatments are being developed to cure infectious bacterial lung diseases such as tuberculosis and anthrax. Phage tablets have even been used to cure food poisoning caused by *Salmonella* bacteria.

(a) Give **two** ways in which the structure of a virus differs from that of a bacterium.

(2)

(b) Suggest how fungi benefit from secreting antibiotics. (line 2)

(2)

(c) Suggest what is meant by the term **resistant**. (line 4)

(1)

(d) Describe how viruses reproduce.

(4)

(e) Suggest **two** reasons why it is important to use phages that are specific. (line 12)

(2)

(f) Name **two** diseases included in the passage that are caused by bacteria.

(2)

(Total 13 marks)

2. The data below show the number of stomata per mm^2 found on the upper and lower surfaces of the leaves of four different plant species.

Plant species	Number of stomata per mm^2	
	Upper surface of leaf	Lower surface of leaf
Apple tree	120	240
Beech tree	0	340
Broad bean	40	280
Maize	52	68

(a) (i) Which species has the highest total number of stomata per mm^2 on its leaves?

(1)

(ii) Which species has the greatest difference between the number of stomata per mm^2 on the upper and lower surfaces?

(1)

(iii) Calculate the total number of stomata on the upper surface of a broad bean leaf with an area of 4 cm^2. Show your working.

(2)

(b) Suggest why most plants have a difference between the number of stomata per mm^2 on the upper and lower surfaces. Explain your answer.

(3)

(c) Maize is a typical cereal plant. Suggest and explain why maize shows only a small difference between the number of stomata per mm^2 on the upper and lower surfaces.

(2)

(d) Draw a labelled diagram of one of the stomata that you would see using a microscope.

(3)

(Total 12 marks)

TOTAL FOR SECTION A: 25 MARKS

SECTION B

Answer any THREE questions

3. (a) Some accidents can cause damage to the brain. For each of the following parts of the brain, describe **two** problems that might occur if they were damaged.

(i) Medulla oblongata

(2)

(ii) Cerebellum

(2)

(iii) Cerebral hemispheres

(2)

(b) (i) Accidents can also damage joints. Draw and label a diagram of an elbow joint.

(4)

(ii) Describe the events that occur when the arm bends at the elbow joint.

(3)

(c) (i) If you touch a hot object you quickly remove your hand. Describe the reflex arc involved in this behaviour.

(6)

(ii) It is claimed that the response to touching a hot object is slow when a person's hands are very cold. Describe an investigation that could be carried out to find out if this claim is true.

(6)

(Total 25 marks)

4. Hardwood species grow slowly but produce high quality wood. A population of hardwood trees forms part of a forest community.

(a) What is meant by the term community?

(2)

(b) (i) Describe how trees convert light energy into chemical energy.

(4)

(ii) The leaves of trees may be eaten by insects and other animals. Explain why the insects and other animals obtain only a small percentage of the light energy that originally fell on the tree.

(3)

(c) Describe an experiment you could do to find out if the size of the leaves affects the ability of insects to eat them.

(6)

(d) As a result of deforestation some species of hardwood trees are becoming rare. To overcome this scientists hope to use tissue culture to produce clones of hardwood trees.

(i) Describe how tissue culture could be used to produce clones of hardwood trees.

(5)

(ii) Describe and explain the harmful effects that deforestation can have on the balance of gases in the atmosphere.

(5)

(Total 25 marks)

5. (a) Explain the role of yeast in making wine.

(4)

(b) Describe how genetic engineering can be used to produce human insulin from bacterial cells.

(7)

(c) Explain what you understand by **each** of the following terms.

(i) Gene

(2)

(ii) Allele

(2)

(iii) Chromosome

(2)

(iv) Nucleus

(2)

(d) Describe an investigation that could be carried out to determine whether height in a cereal plant is affected by day length.

(6)

(Total 25 marks)

6. (a) Describe the structure and function of the male reproductive system.

(7)

(b) Describe the importance of **each** of the following processes in reproduction.

(i) Menstruation

(2)

(ii) Copulation

(2)

(iii) Fertilisation

(2)

(c) (i) State **three** ways that asexual reproduction differs from sexual reproduction.

(3)

(ii) Give an example of a situation in which asexual reproduction would be an advantage for a plant, and explain your answer.

(3)

(d) Describe an investigation you could carry out to determine the effect of age on the ability of rats to produce offspring.

(6)

(Total 25 marks)

QUESTION 7 IS ON THE NEXT PAGE

7. (a) Describe the functions of the different parts of the human heart.

(7)

(b) Describe how the blood performs its role in each of the following.

(i) Transporting oxygen

(3)

(ii) Transporting carbon dioxide

(2)

(iii) Transporting digested food

(3)

(iv) Preventing infection

(4)

(c) Describe an experiment you could carry out to find out if the heart rate of athletes returns to normal after exercise faster than that of people who are not athletes.

(6)

(Total 25 marks)

TOTAL FOR SECTION B: 75 MARKS

TOTAL FOR PAPER: 100 MARKS

END