

Paper Reference(s)

**7040/01**

# **London Examinations GCE**

## **Biology**

### **Ordinary Level**

#### **Paper 1**

**Monday 24 May 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 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.

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

This paper has seven questions. Page eight is blank.

#### **Advice to Candidates**

Write your answers neatly and in good English.

Show all the steps in your calculations, giving your answers at each stage.

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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.

Erythropoietin (EPO) is a protein hormone produced by the kidney. EPO can also be injected into the body for a variety of reasons. EPO stimulates the bone marrow to produce red blood cells. As such, it plays an important role in helping athletes to perform better in endurance events such as running a marathon. Production of EPO is controlled by the level of oxygen in the blood entering the kidney. EPO is rapidly broken down, but its performance-enhancing effect may last for a few weeks.

Some endurance athletes have injected extra EPO into their veins to further improve their performance. This procedure is regarded as unfair in sporting competitions, but it is hard to detect athletes who have cheated in this way.

- 10 Injection of EPO is dangerous because it can lead to an increase in the number of red blood cells. This blood becomes very viscous (flows more slowly) and is more likely to block small blood vessels. If this happens in the brain, a stroke may occur. If this happens in the heart, a heart attack may occur. Both these events could be fatal. The risk of death is increased by the fact that athletes sweat a lot during endurance events.

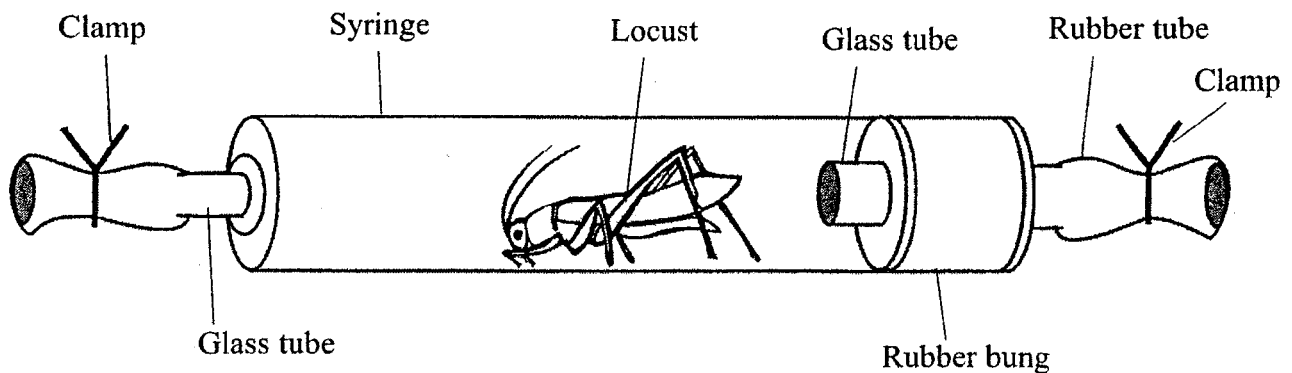
- 15 Other uses of EPO include the following. Firstly, it may be used to improve gas exchange in patients such as those suffering from lung disease. Secondly, it can be used to reduce the amount of blood needed in transfusions to patients suffering from anaemia or serious loss of blood. Genetic engineering techniques are now used to manufacture large amounts of EPO.

- (a) Suggest why the hormone EPO is injected rather than taken by mouth. (line 1) (1)
- (b) What stimulates EPO production? (line 4) (1)
- (c) Suggest two reasons why EPO is injected into a vein rather than an artery. (line 7) (2)
- (d) Explain how EPO improves the performance of endurance athletes. (line 7) (3)
- (e) Explain why it is hard to detect EPO cheats. (line 8) (2)
- (f) Suggest why sweating adds to the risk of death in endurance athletes. (2)
- (g) Suggest how EPO treatment can help people with lung disease. (2)
- (h) Suggest why patients suffering from anaemia or serious blood loss might require a blood transfusion. (1)

(Total 14 marks)

2. When a locust ventilates (breathes), its abdomen moves up and down. We can use this movement to measure the ventilation rate.

A teacher used the apparatus below to measure the ventilation rate of five locusts in different gas mixtures. The results obtained are given in the table below.



Locust	Ventilation rate in different gas mixtures in movements per minute			
	Atmospheric air	Exhaled air (from humans)	100% oxygen	90% oxygen + 10% carbon dioxide
1	32	52	11	53
2	34	54	12	53
3	34	54	14	55
4	35	55	15	56
5	38	58	17	58
<b>Average ventilation rate</b>	<b>35</b>	<b>55</b>	<b>?</b>	<b>55</b>

- (a) (i) Describe the procedure you could use to fill the syringe with exhaled air. (2)
- (ii) Give **three** ways in which atmospheric air differs from exhaled air. (3)
- (b) (i) Calculate the average ventilation rate of locusts in 100% oxygen. (2)
- (ii) Calculate the percentage increase in average ventilation rate of the locusts in exhaled air compared with when they were in atmospheric air. Show your working. (2)
- (c) Describe how the data support the idea that carbon dioxide controls ventilation rate. (2)

(Total 11 marks)

**TOTAL FOR SECTION A: 25 MARKS**

## SECTION B

Answer any **THREE** questions

3. (a) (i) Name **two** hormones, produced in the human body, associated with female reproduction. (2)
- (ii) For **each** hormone you have named, give its site of production, the target organs or tissues it affects, and one of its effects. (6)
- (iii) Using **one** of the female reproductive hormones as an example, explain what is meant by the term 'negative feedback'. (2)
- (b) Plant cells are able to release plant growth substances and, like animal hormones, these can have effects elsewhere in the organism.
- (i) Name **one** substance released by plant cells that can alter the growth of the plant. (1)
- (ii) For the substance you have named, give its site of production and describe its effects. (2)
- (c) Give the location and function of **each** of the following structures in the brain.
- (i) Cerebral hemispheres (2)
- (ii) Cerebellum (2)
- (iii) Medulla oblongata (2)
- (d) Describe a simple experiment you could carry out to show that sensitivity of skin to touch varies on different areas of the body. Describe the results you might expect and explain their cause. (6)

**(Total 25 marks)**

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4. (a) Describe what happens to the food you eat from the time you swallow it until it leaves the stomach. (8)
- (b) Digestion breaks down large food molecules into smaller molecules. List **four** of the products of digestion that are absorbed by the small intestine. (4)
- (c) Name the **two** processes by which food molecules are absorbed through the gut wall. (2)
- (d) Absorbed food molecules are taken to the liver in the hepatic portal vein. Describe the route taken by the food molecules from the liver to the lungs. (5)
- (e) Coffee contains a drug called caffeine. After drinking a cup of coffee the caffeine is absorbed by the gut. Describe an experiment you could do to find out if caffeine increases the heart rate of humans. You should include a suitable control. (6)

(Total 25 marks)

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5. (a) With reference to plants and animals, describe how anaerobic respiration differs from aerobic respiration. (5)
- 193 (b) Describe a controlled experiment you could carry out to show that respiration of germinating seeds produces heat. (6)
- (c) The terms **producer**, **herbivore** and **carnivore** refer to **three** different trophic levels.
- (i) Give the meaning of each of these terms. (3)
- (ii) Draw and label a pyramid of biomass using the terms producer, herbivore and carnivore. (2)
- (iii) Explain the shape of a pyramid of biomass. (3)
- (d) Describe the processes involved in the carbon cycle. (You may draw a diagram to help in your description.) (6)

(Total 25 marks)

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6. (a) Farmers use chemical fertilisers containing mineral salts to improve the growth of their crop plants.

Name **three** minerals that could be in the fertiliser. For each mineral, describe **one** way in which it helps crop plants to grow.

(6)

- (b) Describe an investigation you could do to compare two brands of chemical fertiliser used to improve the growth of crop plants.

(6)

- (c) In certain countries, forests are cut down to create more land for growing crop plants. Describe the problems that result from deforestation.

(7)

- (d) A pesticide is a chemical used to kill insects that eat crop plants. By using genetic engineering techniques crop plants have been produced that can make pesticide inside their cells. What is the advantage to the farmer of having such a crop plant?

(2)

- (e) Biological control is a method that can be used to control insect pests.

- (i) What is meant by the term **biological control**?

(2)

- (ii) Give **two** advantages of using biological control rather than chemical pesticides.

(2)

(Total 25 marks)

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7. (a) State the location and **one** function of each of the following structures in a typical plant cell.

(i) Cell wall (2)

(ii) Cell membrane (2)

(iii) Cytoplasm (2)

(iv) Nucleus (2)

(b) Describe how a white blood cell of a human differs from a palisade mesophyll cell of a plant. (4)

(c) Describe how you could test a piece of plant tissue for each of the following.

(i) Starch (2)

(ii) Glucose (3)

(iii) Protein (2)

(d) Describe an experiment you could carry out to investigate the effect of different concentrations of a sodium chloride solution on the size of pieces of potato tissue. Include the results you would expect to get. (6)

**(Total 25 marks)**

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**TOTAL FOR SECTION B: 75 MARKS**

**END**