

Paper Reference(s)

7040/01

London Examinations GCE

Biology

Ordinary Level

Paper 1

Tuesday 17 January 2006 – Afternoon

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. All blank pages are indicated.

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.

Lactation

One of the unique features of all mammals is their mammary glands. In females the mammary glands produce milk but in males they are usually non-functional. Only one male mammal (the Dayak fruit bat) is known to produce milk. Very occasionally men have been known to produce milk but this is due to a hormone imbalance.

- 5 Mammary glands are like sweat glands. In some mammals, such as the platypus, the milk simply oozes from the skin in the same way as sweat. Other mammals have teats, and these help deliver the milk directly into the mouths of the young. However, having teats limits the number of young that a female can suckle, and so most female mammals have twice as many teats as their average litter.
- 10 Milk is a liquid made up of water, proteins, fats, carbohydrates and minerals. The milk of different species has a different balance of each of these components, suited to the needs of their young. Milk that is high in protein helps the young to grow fast while milk that is high in fat helps them gain weight quickly and form a layer of fat under the skin (blubber). Mammals that live in cold environments tend to produce milk that is rich in fat. For example, seals and sea lions produce milk
- 15 that is over 50 per cent fat, and hooded seal pups grow at the rate of about 5 kg per day.

Kangaroos often suckle two young of different ages at the same time, one very young and one older. They produce milk of two different compositions from the teats used by their young. The very young kangaroo is firmly attached to one teat constantly for the first few weeks and is provided with milk with little fat in it. The older kangaroo receives milk with almost 20 per cent fat from another

20 teat.

Milk also contains antibodies, which are passed on from the mother to her offspring, providing them with immunity from many diseases.

Producing milk for her young puts a lot of strain on a mother's resources. She has to produce an ideal, balanced diet for the growing young from her own diet. In hard times mothers may have to

25 produce the milk by metabolising their own body tissues. If a drought or period of starvation continues too long, the mother will eventually stop producing milk and the young may die.

- (a) Suggest why most female mammals have twice as many teats as their average litter. (lines 8 and 9)

(1)

- (b) Suggest why mammals that live in cold climates produce milk rich in fat. (lines 13 and 14)

(2)

- (c) Describe how you could test a sample of mammal milk for protein. State the result you would get.

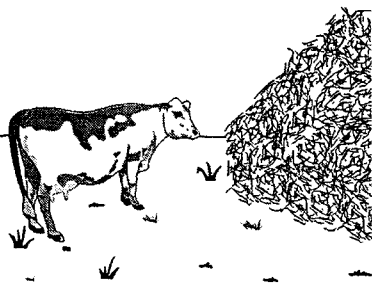
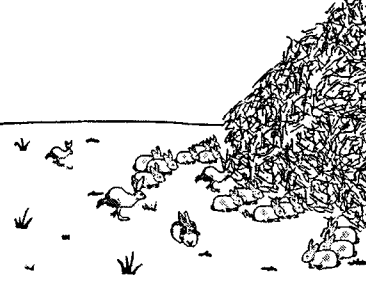
(2)

- (d) Suggest why kangaroos produce milk of two different compositions for their two young.
(line 17) (2)
- (e) Suggest why some men do produce milk. (1)
- (f) Explain why it may be an advantage to a mother to stop producing milk during a period of starvation. (lines 25 and 26) (2)
- (g) Many human mothers feed their young with breast milk rather than commercially produced powdered milk. Give **three** reasons why a mother may choose breast milk rather than powdered milk. (3)

(Total 13 marks)

2. There is a difference in the efficiency of meat production in different animals.

The table below compares meat production in cattle and rabbits. It shows how one cow and many rabbits of equivalent weight, gain the same body mass after eating the same mass of food.

Feature	 One cow	 Many rabbits
Number of animals	1	300
Total body mass of animal(s) at start in kg	590	590
Total mass of hay eaten in kg	1000	1000
Time taken to eat 1000 kg of hay in days	133	33
Mass of hay eaten per day in kg	7.5	30.3
Gain in body mass per day in kg	0.90	?
Heat loss per day in kJ	84 000	336 000
Total gain in body mass in kg (from 1000 kg of hay)	120	120

- (a) Calculate the mass of the cow after feeding on the hay for 20 days. Show your working. (2)
- (b) (i) Calculate how many times greater the heat loss per day is from all the rabbits compared to that of the cow. (1)
- (ii) Suggest a reason for the greater heat loss per day for the rabbits compared to that for the cow. (1)
- (iii) The rabbits and the cow need to replace the heat they lose. Give **one** reason why this is important and explain how they replace the heat they lose. (3)

- (c) (i) Calculate the gain in body mass per day for the rabbits. (1)
- (ii) Which animal is better (more efficient) in terms of meat production per unit time? Explain your answer. (2)
- (iii) Suggest how you could improve the rate of meat production from the cow or from the rabbits. (2)

(Total 12 marks)

TOTAL FOR SECTION A: 25 MARKS

SECTION B

Answer any THREE questions

3. (a) Describe how each of the following blood components carries out its function(s).
- (i) Red blood cells (3)
- (ii) Plasma (3)
- (iii) Platelets (2)
- (b) Describe how white blood cells protect the body from infection by microorganisms. (4)
- (c) (i) Name **two** microorganisms that cause disease in the body and for **each** name the disease that they cause. (4)
- (ii) For **one** of the diseases you have named, describe how it is spread and how this spread can be controlled. (2)
- (d) Describe an investigation you could carry out to determine the effect of a short period of exercise on heart rate. In your account you should include full experimental details and describe the results you would expect. (7)

(Total 25 marks)

4. (a) What is meant by each of the following terms?
- (i) Population (1)
 - (ii) Community (1)
 - (iii) Habitat (1)
- (b) (i) Suggest how the biomass of plants in an ecosystem might change between a cold winter and a warm spring. Explain your answer. (4)
- (ii) Suggest how the number of animals in this ecosystem might change over the same time period. Explain your answer. (3)
- (c) Describe the events that occur when a seed germinates. (8)
- (d) Describe an investigation you could carry out to determine the effect of soil acidity on the yield of a cereal crop. (7)

(Total 25 marks)

5. (a) Describe the structure of the human nephron and explain how it carries out its role in excretion and osmoregulation. (8)
- (b) (i) Describe how *Amoeba* (a fresh water protozoan) regulates its water content. (3)
- (ii) Suggest why a protozoan living in salt water does not need to regulate its water content. (2)
- (c) Explain how each of the following changes would affect the urine produced by a human.
- (i) Drinking several litres of water (2)
- (ii) An increase in external temperature from 15 °C to 25 °C (2)
- (iii) Eating a meal rich in protein (2)
- (d) Describe an experiment you could carry out to investigate whether the water content of the soil differs in two locations. (6)

(Total 25 marks)

6. (a) Give **three** ways that sexual reproduction differs from asexual reproduction. (3)
- (b) Draw a fully labelled diagram of an insect-pollinated flower. (6)
- (c) (i) Describe how cross-pollination differs from self-pollination. (1)
- (ii) Suggest **one** advantage and **one** disadvantage of cross-pollination in a plant. (2)
- (iii) Describe the sequence of events that occur from pollination to seed formation in an insect-pollinated flower. (7)
- (d) Describe an investigation you could carry out to determine if the number of visits by insects to a flower affects the number of seeds produced. (6)

(Total 25 marks)

7. (a) Describe what happens to food in the stomach. (4)
- (b) Describe how the structure of the small intestine helps to absorb food molecules. (4)
- (c) (i) Describe how a mould fungus feeds on a piece of bread. (3)
- (ii) Describe an experiment to find out how air temperature affects the growth of a mould fungus on a piece of bread. (6)
- (d) Plants make food by photosynthesis. Draw a labelled diagram of a section through a leaf. (8)

(Total 25 marks)

TOTAL FOR SECTION B: 75 MARKS

END