

**BIOLOGY**

**Standard Level**

Wednesday 10 November 1999 (afternoon)

Paper 2

1 hour

**A**

Candidate name:	Candidate category & number:										
	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 10%; height: 20px;"></td> <td style="width: 10%;"></td> </tr> </table>										
<p>This examination paper consists of 2 sections, Section A and Section B.                  The maximum mark for Section A is 20.                  The maximum mark for Section B is 20.                  The maximum mark for this paper is 40.</p> <p style="text-align: center;"><b>INSTRUCTIONS TO CANDIDATES</b></p> <p>Write your candidate name and number in the boxes above.</p> <p>Do NOT open this examination paper until instructed to do so.</p> <p>Section A: Answer ALL of Section A in the spaces provided.</p> <p>Section B: Answer ONE question from Section B. You may use the lined pages at the end of this paper and/or attach extra sheets of paper with your candidate number clearly marked at the top.</p> <p>At the end of the examination, complete box B below with the number of the question answered in Section B.</p>											

**B**

QUESTIONS ANSWERED	
A/ ALL	
B/	
Number of extra sheets attached	

**C**

EXAMINER	TEAM LEADER
/20	/20
/20	/20
TOTAL /40	TOTAL /40

**D**

IBCA
/20
/20
TOTAL /40

**EXAMINATION MATERIALS**

Required:  
 Calculator

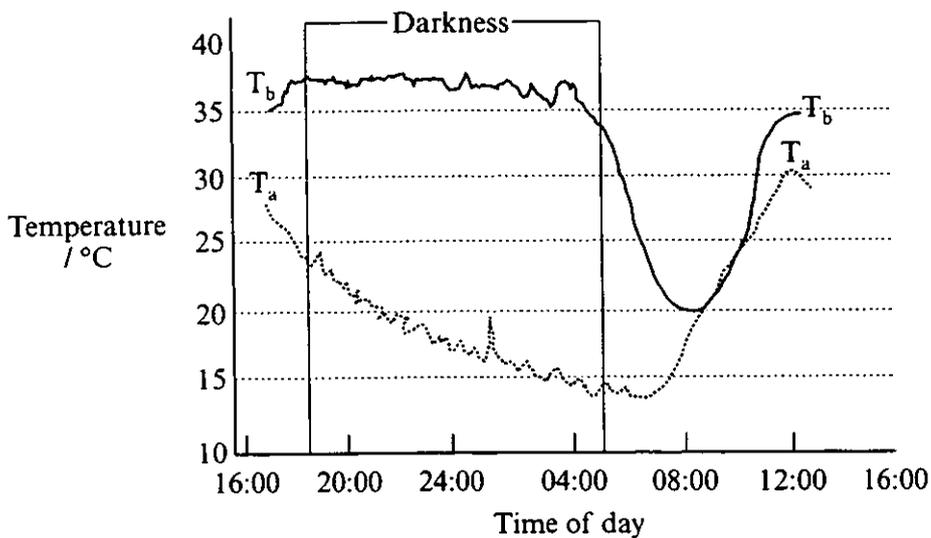
Allowed:  
 A simple translating dictionary for candidates not working in their own language

SECTION A

Candidates must answer all questions in the spaces provided.

- 1. Respiration in humans and other mammals generates heat which can be used to keep the body temperature above that of the surroundings.

Many mammals found in the southern hemisphere, including marsupials, vary their body temperature according to a daily cycle. The mouse lemur (*Microcebus myoxinus*) is an example of such a mammal. To investigate this daily cycle *M. myoxinus* was studied in its native habitat in Madagascar. Data-loggers which recorded body temperature ( $T_b$ ) over 24 hour periods were implanted in the bodies of several of these mammals. Air temperature ( $T_a$ ) was recorded at the same time. A typical set of results is shown in the graph below.



[Source: Cossins and Barnes, *Nature* (1996), 382, page 582]

- (a) Using only the data in the graph, state **two** differences between  $T_a$  and  $T_b$  during the hours of darkness. [2]

1 .....

2 .....

- (b)  $T_b$  rises from 08:00 to 12:00. Explain briefly how this temperature rise occurs. [2]

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(This question continues on the following page)

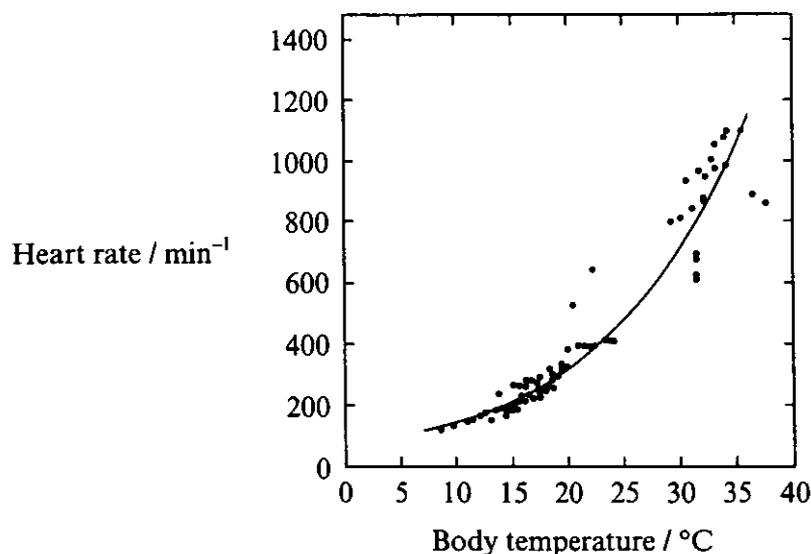
(Question 1 continued)

- (c) Predict, with a reason, whether *M. myoxinus* is active in the hours of daylight or the hours of darkness. [1]

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The Etruscan shrew (*Suncus etruscus*) is the smallest known mammal with an average adult mass of less than 2 grams. It sometimes allows its body temperature to drop below the normal level (36 °C). Physiologists did an experiment in which specimens of *S. etruscus* were cooled artificially and then allowed to rewarm themselves. Heart rate was measured during rewarming. The results are shown in the scattergram below, including the line of best fit.



[Source: Fons *et al*, *Journal of Experimental Biology* (1997), 200, page 1454]

- (d) (i) Using only the data in the scattergram, outline the relationship between heart rate and body temperature in *S. etruscus*. [2]

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- (ii) Suggest **one** reason for the relationship. [1]

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(Question 1 continued)

- (e) Suggest **one** advantage to mammals such as *M. myoxinus* and *S. etruscus* of allowing the body temperature to fall for some of the time. [1]

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- (f) Predict **one** factor which would cause *S. etruscus* to lower its body temperature temporarily. [1]

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- 2. (a) (i) State the function of phagocytic leucocytes. [1]

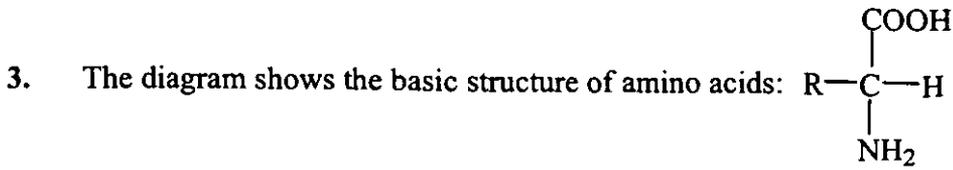
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- (ii) Outline where in the body phagocytic leucocytes carry out their function. [2]

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- (b) Explain briefly the need for small numbers of many types of B-lymphocyte in the body. [2]

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(a) State what is represented in the diagram by the letter R. [1]

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(b) Draw a simple diagram to show how two amino acids are linked together. [2]

(c) Amino acids are linked together to form polypeptides at special sites in the cytoplasm of both prokaryotic and eukaryotic cells.

Compare the sites where polypeptides are formed in prokaryotic cells with the sites in eukaryotic cells. [2]

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**SECTION B**

*Answer ONE question. Up to two additional marks are available for the quality of construction of your answer. You may use the lined pages at the end of this paper and/or attach extra sheets of paper with your candidate number clearly marked at the top.*

4. (a) Define *enzyme*. [3]
- (b) Describe enzyme activity, using the 'lock-and-key' model. [7]
- (c) Explain **two** examples of how enzymes are used in biotechnology. [8]
5. (a) List the characteristics of chromosomes that can be used to arrange them in pairs. [3]
- (b) Outline the events in meiosis that reduce the number of chromosomes in the nucleus by half. [8]
- (c) Explain, how events in meiosis can result in the birth of a child with Down's Syndrome. [7]
6. (a) List the gases which are causing an increase in the greenhouse effect and the main sources of these gases. [5]
- (b) Outline measures which would reduce the greenhouse effect. [6]
- (c) Discuss the possible effects of increased atmospheric carbon dioxide concentration on food webs. [7]
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