

**ADVANCED SUBSIDIARY GCE  
BIOLOGY**

Biology Foundation

**TUESDAY 15 JANUARY 2008**

**2801**

Afternoon  
Time: 1 hour

Candidates answer on the question paper  
**Additional materials:** Electronic calculator  
Ruler (cm/mm)



Candidate  
Forename

Candidate  
Surname

Centre  
Number

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Candidate  
Number

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**INSTRUCTIONS TO CANDIDATES**

- Write your name in capital letters, your Centre Number and Candidate Number in the boxes above.
- Use blue or black ink. Pencil may be used for graphs and diagrams only.
- Read each question carefully and make sure that you know what you have to do before starting your answer.
- Answer **all** the questions.
- Do **not** write in the bar codes.
- Do **not** write outside the box bordering each page.
- Write your answer to each question in the space provided.

**INFORMATION FOR CANDIDATES**

- The number of marks for each question is given in brackets [ ] at the end of each question or part question.
- The total number of marks for this paper is **60**.
- You will be awarded marks for the quality of written communication where this is indicated in the question.
- You may use an electronic calculator.
- You are advised to show all the steps in any calculations.

**FOR EXAMINER'S USE**

Qu.	Max.	Mark
1	7	
2	8	
3	8	
4	13	
5	13	
6	11	
<b>TOTAL</b>	<b>60</b>	

This document consists of **15** printed pages and **5** blank pages.

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Answer **all** the questions.

1 (a) State the term given to each of the following:

(i) a collection of identical cells that perform a single function;

.....[1]

(ii) the ability, in microscopy, to distinguish between two close points;

.....[1]

(iii) the bond that joins monosaccharides together in a carbohydrate;

.....[1]

(iv) a nucleus that contains only one of each pair of homologous chromosomes.

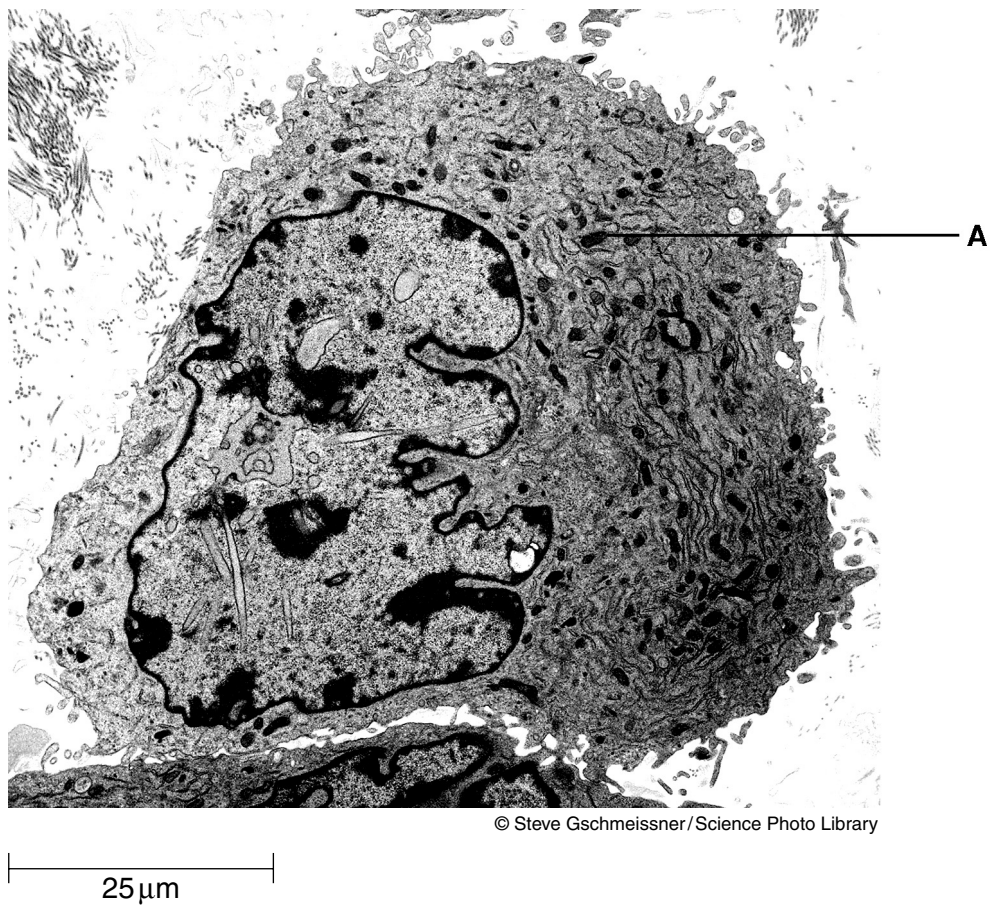
.....[1]

(b) Distinguish between the terms *niche* and *habitat*.

.....  
.....  
.....  
.....  
.....  
.....  
.....[3]

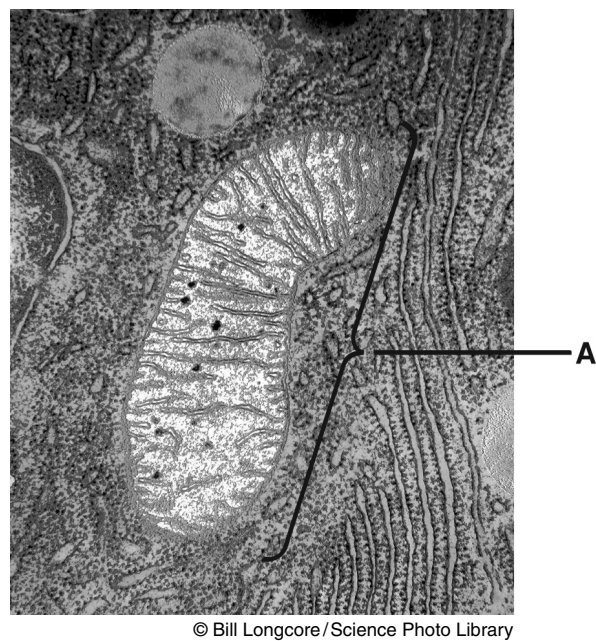
[Total: 7]

2 (a) Fig. 2.1 is an electron micrograph of a cancer cell.



**Fig. 2.1**

Fig. 2.2 shows an enlarged electron micrograph of structure **A**.



**Fig. 2.2**

- (i) State **one** feature, **visible in Fig. 2.1**, that indicates that this cell is from a eukaryote.

.....[1]

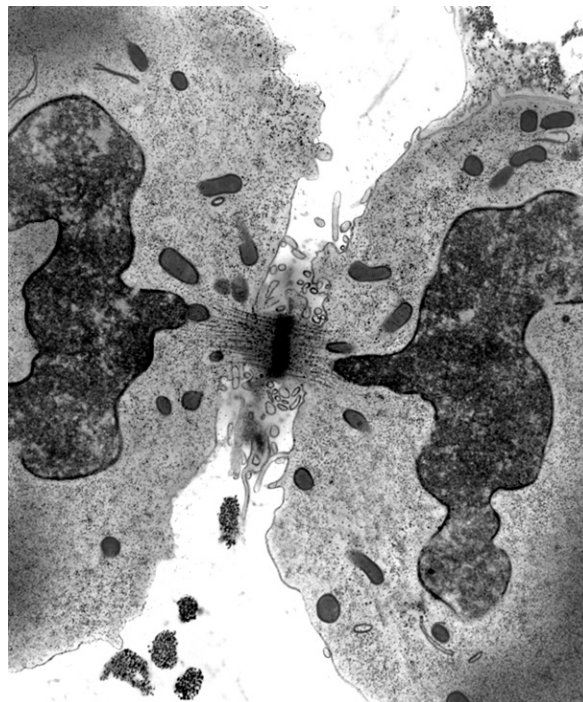
- (ii) State the function of structure **A**.

.....[1]

- (iii) Use the scale bar to calculate the magnification of the electron micrograph in Fig. 2.1.  
Show your working.

Answer = .....[2]

- (b) Fig. 2.3 is an electron micrograph of a cancer cell in the final stage of cell division.



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**Fig. 2.3**

Name the stage of cell division shown in Fig. 2.3.

.....[1]

- (c) (i) Cancer may be caused by exposure to certain chemicals.

State the name given to cancer-causing chemicals.

.....[1]

- (ii) Roy Castle was an entertainer and television presenter who was diagnosed with lung cancer in 1992 and died in 1994. He had been in the entertainment business for over 30 years, much of it spent performing in clubs and bars as a comedian and jazz musician.

Suggest why Roy Castle developed lung cancer, even though he had never smoked.

.....  
.....[1]

- (iii) Suggest how legislation in the UK has attempted to reduce this health risk.

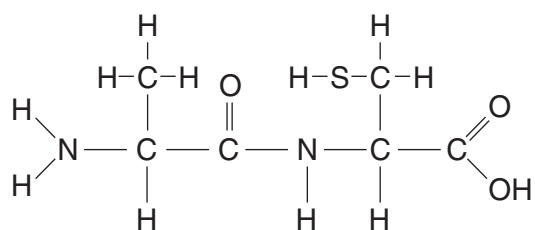
.....  
.....[1]

[Total: 8]

**7**  
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- 3 Fig. 3.1 is a diagram of a dipeptide, formed from the two amino acids alanine and cysteine.



**Fig. 3.1**

- (a) (i) Using the information in Fig. 3.1 to help you, state how the two amino acids alanine and cysteine differ from one another when they are **not** combined together.

.....

.....[1]

- (ii) Draw a line around the peptide bond on Fig. 3.1. [1]

- (b) State what is meant by the *primary structure* of a protein.

.....

.....[1]



(c) Collagen and haemoglobin are examples of proteins.

- (i) State one type of bond, **other than peptide bonds**, that collagen and haemoglobin have in common.

.....[1]

- (ii) The table below gives five statements about collagen.

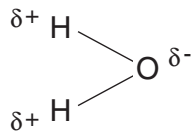
In each case, you must describe a feature of haemoglobin that makes it different from collagen. The first one has been done for you.

collagen	haemoglobin
triple helix	<b>4 chains with folds and helix spirals</b>
fibrous	
made of only 1 type of polypeptide chain	
only made of polypeptide chains	
structural/mechanical function in fibrous connective tissue	

[4]

[Total: 8]

- 4 (a) Fig. 4.1 is a diagram of a water molecule.



**Fig. 4.1**

Using the information in Fig. 4.1 to help you, explain why water is such a good transport medium.

.....

.....

.....

.....

.....

.....

.....

.....[4]

[8]

[Total: 13]

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**12**  
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- 5 (a) During transcription, one of the DNA strands acts as a template for the formation of mRNA.

In a particular nucleotide sequence of the 'template' strand of DNA, 22% of the nucleotides have guanine as their base and 28% of them have adenine as their base.

State the percentage of each of the following bases in the strand of **mRNA** formed from this DNA strand.

cytosine .....

uracil .....

thymine ..... [3]

- (b) A length of DNA with a specific nucleotide sequence carries the code for the formation of the enzyme pectinase.

- (i) State the name given to a length of DNA of this type.

.....[1]

- (ii) Outline how a DNA nucleotide sequence leads to the production of an enzyme such as pectinase.

.....  
.....  
.....  
.....  
.....  
.....  
.....[3]

- (c) The juice from freshly pressed apples is often cloudy. This cloudiness can be cleared by using the enzyme pectinase.

A student carried out an investigation into the action of pectinase on the cloudy juice from freshly pressed apples.

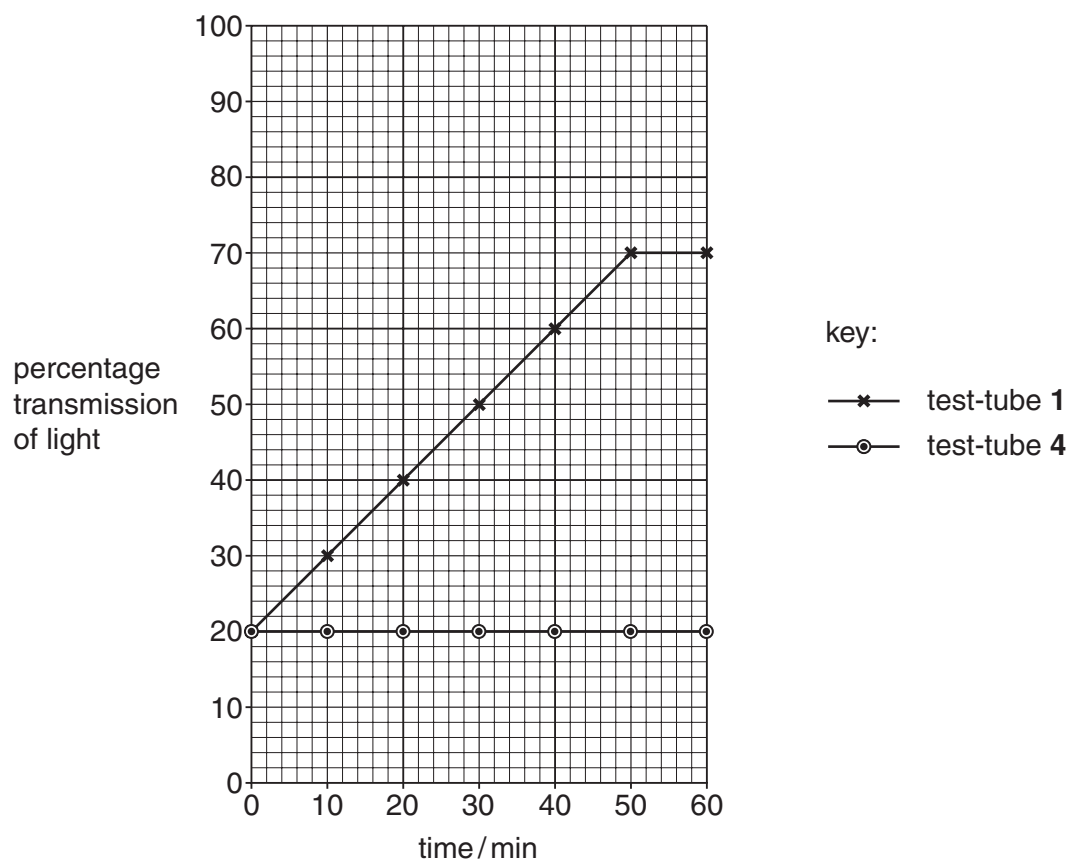
Four test-tubes were set up with different contents as follows:

test-tube	contents
<b>1</b>	10 cm <sup>3</sup> apple juice + 1 cm <sup>3</sup> pectinase solution
<b>2</b>	10 cm <sup>3</sup> apple juice + 1 cm <sup>3</sup> distilled water
<b>3</b>	10 cm <sup>3</sup> distilled water + 1 cm <sup>3</sup> pectinase solution
<b>4</b>	10 cm <sup>3</sup> apple juice + 1 cm <sup>3</sup> boiled pectinase solution

Each test-tube was shaken thoroughly and then placed in a water bath that was maintained at 40 °C for 60 minutes.

At regular intervals, samples were taken from each test-tube and tested to measure the percentage of light that passed through the sample. The percentage transmission of light was plotted on a graph.

Fig. 5.1 shows the graph obtained for test-tubes **1** and **4**.



**Fig. 5.1**

- (i) Using the information in Fig. 5.1, describe and explain the results obtained for test-tubes **1** and **4**.

.....

.....

.....

.....

.....

.....[3]

- (ii) Explain why test-tube **2** was included in the experiment.

.....

.....

.....

.....[2]

- (iii) Sketch on the graph the result you would expect for test-tube **3**. [1]

[Total: 13]

6 Fig. 6.1 shows part of the nitrogen cycle in a field grazed by cows.

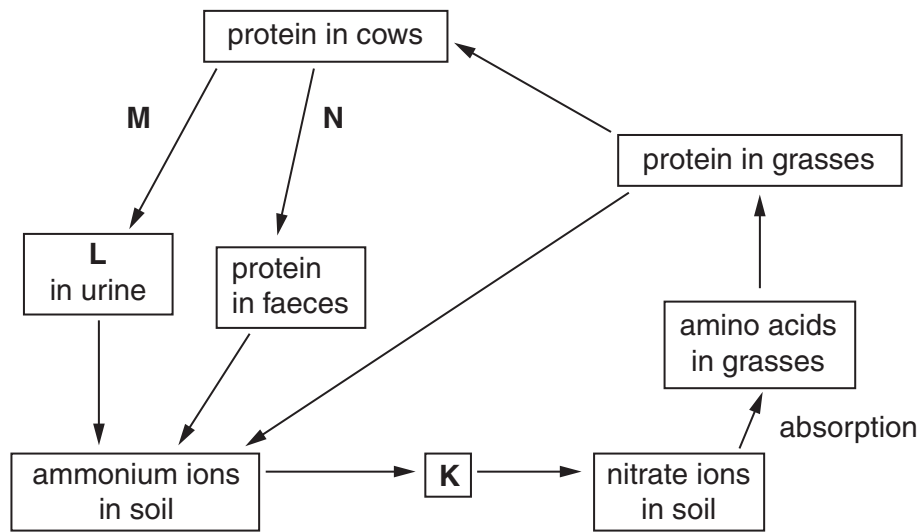


Fig. 6.1

(a) (i) Name the substances **K** and **L**.

**K** .....

**L** .....[2]

(ii) Name the processes **M** and **N**.

**M** .....

**N** .....[2]

(iii) Name the process that converts ammonium ions to nitrate ions in this cycle.

.....[1]



- (b) One of the problems facing farmers is that of maintaining the fertility of the soil in their fields.
- (i) If a field is grazed by cows, nitrogen compounds are removed by the 'harvesting' of milk and meat. This reduces the fertility of the soil.

Using the information in Fig. 6.1, explain how some of the soil fertility can be regained if the field continues to be grazed by cows.

.....

.....

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.....

.....

.....[3]

- (ii) When there are no cows to graze in a field, farmers often sow clover.

Explain how clover growing in the field maintains soil fertility.

.....

.....

.....

.....

.....

.....[3]

[Total: 11]

**END OF QUESTION PAPER**

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