OCR
RECOGNISING ACHIEVEMENT

OXFORD CAMBRIDGE AND RSA EXAMINATIONS
Advanced Subsidiary GCE

BIOLOGY 2801

Biology Foundation

Monday **2 JUNE 2003** Morning 1 hour

Candidates answer on the question paper.
Additional materials:
Electronic Calculator

Candidate Name	Centre Number	Candidate Number

TIME 1 hour

INSTRUCTIONS TO CANDIDATES

- Write your name in the space above.
- Write your Centre number and Candidate number in the boxes above.
- Answer **all** the questions.
- Write your answers, in blue or black ink, in the spaces on the question paper.
- Read each question carefully before starting your answer.

INFORMATION FOR CANDIDATES

- The number of marks is given in brackets [ ] at the end of each question or part question.
- 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	10	
2	9	
3	10	
4	13	
5	14	
6	4	
TOTAL	60	

This question paper consists of 14 printed pages and 2 blank pages.

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For Examiner's Use

Answer **all** the questions.

1 There are many different polysaccharides found in plants and animals. Gum arabic is classed as a complex polysaccharide and is produced by the tree, *Acacia senegal*. It seeps out from the cut surface when the tree is damaged.

The molecules of gum arabic have a branched structure and are soluble in water. It is classed as a heteropolysaccharide, which means that it is made up of a number of different sugars. Hydrolysis of gum arabic produces four different monosaccharides.

(a) Describe what happens during the hydrolysis of a polysaccharide molecule.

.....

.....

..... [2]

(b) Gum arabic is similar to other polysaccharides in a number of ways but also differs from them.

Complete the table below, comparing gum arabic with other polysaccharides.

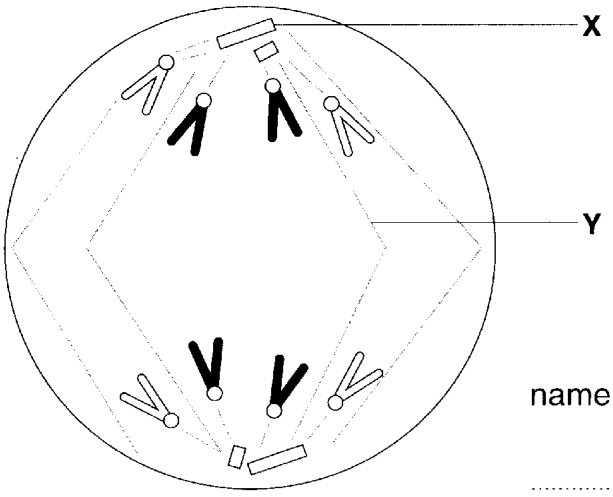
	gum arabic	amylopectin (a component of starch)	cellulose	glycogen
branched structure	yes	yes		
heteropolysaccharide	yes		no	
found in animals/plants	plants		plants	
function in organism	healing			energy store

[8]

[Total: 10]

2 **(a)** Fig. 2.1 is a series of three diagrams showing some of the events of mitosis in an animal cell. Each diagram represents a stage in mitosis. They are **not** in the correct order.

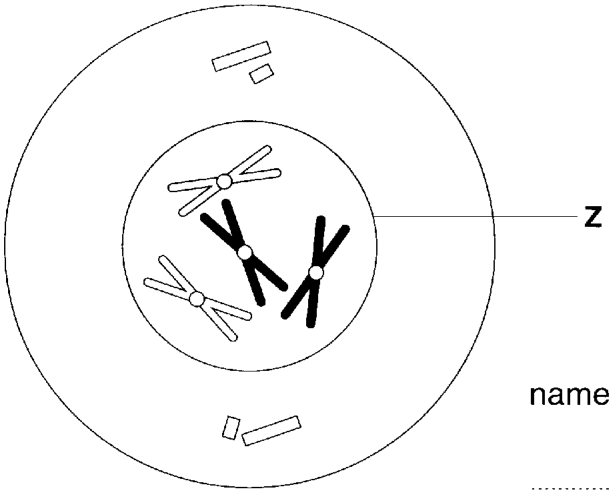
A



name of stage:

.....

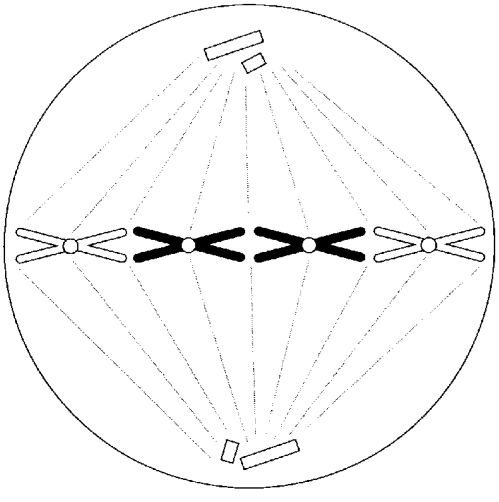
B



name of stage:

.....

C



name of stage:

.....

Fig. 2.1

For Examiner's Use

(i) Using the letters **A** to **C**, put the stages in the correct order.

.... [1]

(ii) For each diagram, **A**, **B** and **C**, write the **name** of the stage in the space provided on Fig. 2.1. [3]

(iii) Name structures **X** to **Z**.

X .....

Y .....

Z ..... [3]

(b) Interphase is often described as the 'resting stage' of the mitotic cell cycle, but this can be misleading.

Explain why interphase is not a 'resting stage' in the cell cycle.

.....

.....

..... [2]

[Total: 9]

3 Fig. 3.1 is a diagram of a bacterium as seen using an electron microscope.

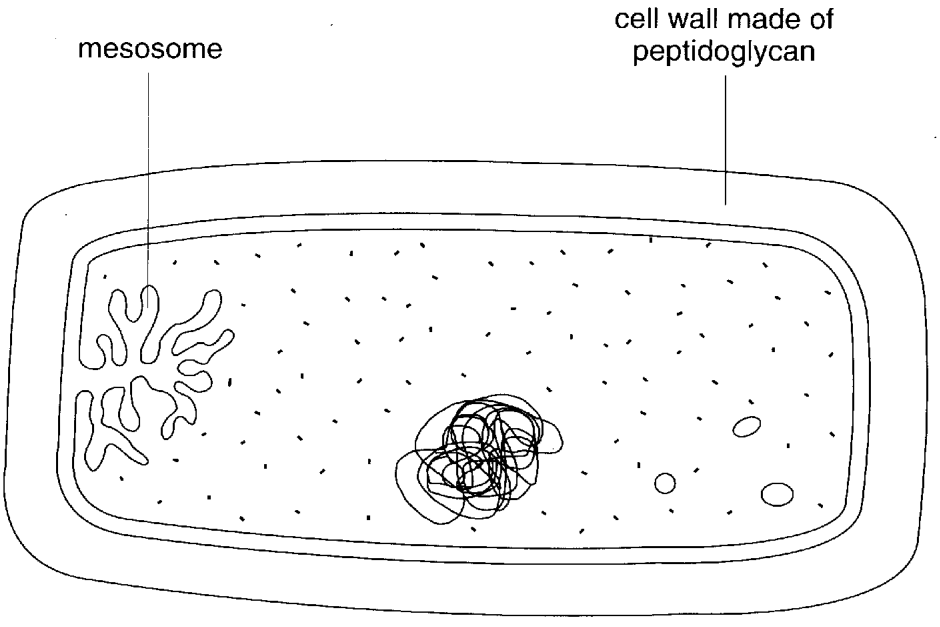


Fig. 3.1

(a) The bacterium contains DNA, as do eukaryotic cells.

(i) State **two other** ways in which the structure of the cell in Fig. 3.1 is **similar** to a typical animal cell.

1 .....

.....

2 .....

..... [2]

(ii) Describe how bacterial DNA differs from that found in eukaryotic cells.

.....

.....

.....

.....

.....

..... [3]

For Examiner's Use

(b) Some bacteria similar to that shown in Fig. 3.1 can cause disease. Antibiotics are often given to patients who are suffering from diseases caused by bacteria. Examples of the mode of action of two antibiotics are given below.

Antibiotic 1 binds to the enzyme RNA polymerase in bacteria, preventing transcription.

Antibiotic 2 prevents the formation of peptide cross links between peptidoglycan chains in the cell wall.

(i) Explain why the prevention of transcription leads to the death of bacteria.

.....

.....

.....

.....

..... [3]

(ii) Suggest how the action of antibiotic 2 on cell walls leads to the death of bacteria.

.....

.....

.....

.....

..... [2]

[Total: 10]

4 **(a)** Not all the energy contained in organisms at one trophic level is available to organisms in the next trophic level.

The table below lists ways in which energy in a lower trophic level can be lost or be unavailable to the next trophic level.

Complete the table, placing a tick (✓) in the appropriate box on each row. The first one has been done for you.

ways energy is lost	between producer and primary consumer only	between primary consumer and secondary consumer only	between both pairs of trophic levels
respiration			✓
indigestible material			
muscle contraction			
excretion			

[3]

(b) In this question, one mark is available for the quality of written communication.

Fig. 4.1 shows part of the nitrogen cycle.

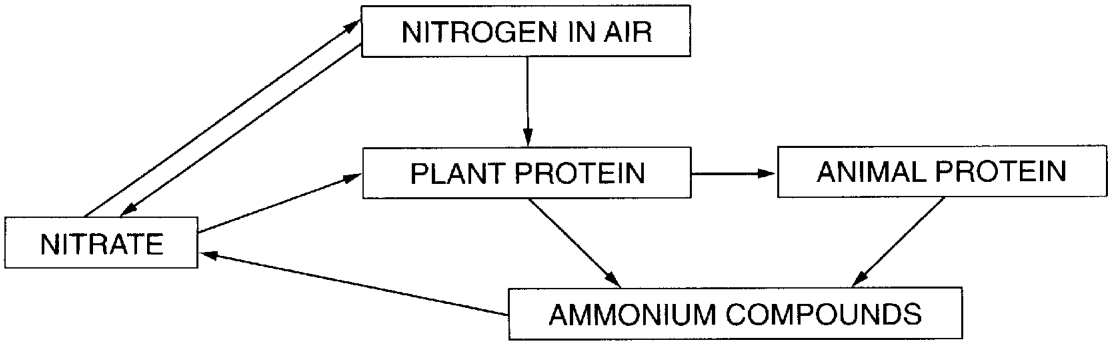


Fig. 4.1

Explain how nitrogen is cycled in ecosystems.

In your answer you should refer to the role of microorganisms.

.....

.....

.....

.....

For Examiner's Use

[9]

Quality of Written Communication [1]

[Total: 13]

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For Examiner's Use

5 **(a)** Proteins may be globular or fibrous.

Name **one** globular protein and **one** fibrous protein.

globular .....

fibrous ..... [2]

(b) When enzymes are heated to high temperatures, they cease to function. They are said to become denatured.

Describe the effect of high temperature on enzymes.

.....

.....

.....

.....

.....

.....

.....

..... [4]

Question 5 continues on the next page.

(c) During protein synthesis, amino acids are carried by transfer RNA (tRNA) molecules to ribosomes, where the tRNA binds to messenger RNA (mRNA). Table 5.1 shows the **tRNA** triplet codes (anticodons) for some tRNA molecules and the amino acid each one carries.

Table 5.1

tRNA triplet code (anticodon)	amino acid carried
UCU	leucine
UCA	arginine
UUC	lysine
CCC	glycine
GGG	proline
AGC	serine
AUA	tyrosine
CAA	valine
CGC	alanine
AGG	serine

Fig. 5.1 shows a stage in the synthesis of a polypeptide. The mRNA molecule is moving through the ribosome and the second and third tRNA molecules are lined up with the mRNA.

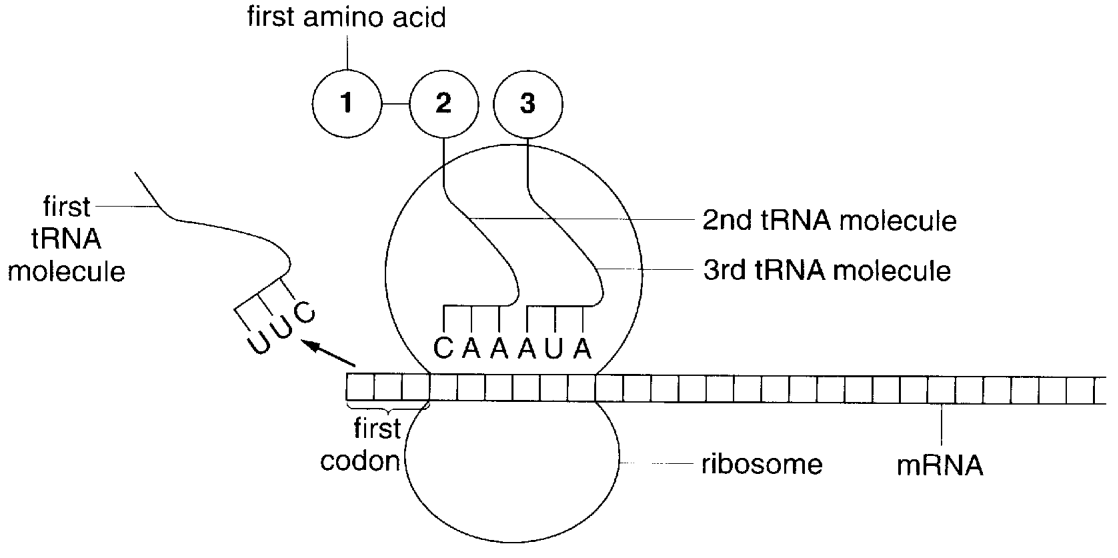

Fig. 5.1

(i) Identify the amino acids labelled **1**, **2** and **3**.

1 .....

2 .....

3 ..... [3]

(ii) State the three mRNA triplet codons with which the first three tRNA molecules pair.

first codon .....

second codon .....

third codon .....[3]

(d) During the formation of mRNA from the DNA template, the following two errors were made.

Error 1: the sequence AGA was formed at one point on the **mRNA** strand instead of AGU.

Error 2: the sequence UCG was formed at another point on the **mRNA** strand instead of UCC.

Using the information in Table 5.1, state the effect that each of these errors would have on the amino acid sequence.

(i) Error 1

.....

..... [1]

(ii) Error 2

.....

..... [1]

[Total: 14]

6 **(a)** Fig. 6.1 shows a mechanism for the transport of glucose across a plasma (cell surface) membrane using a carrier protein.

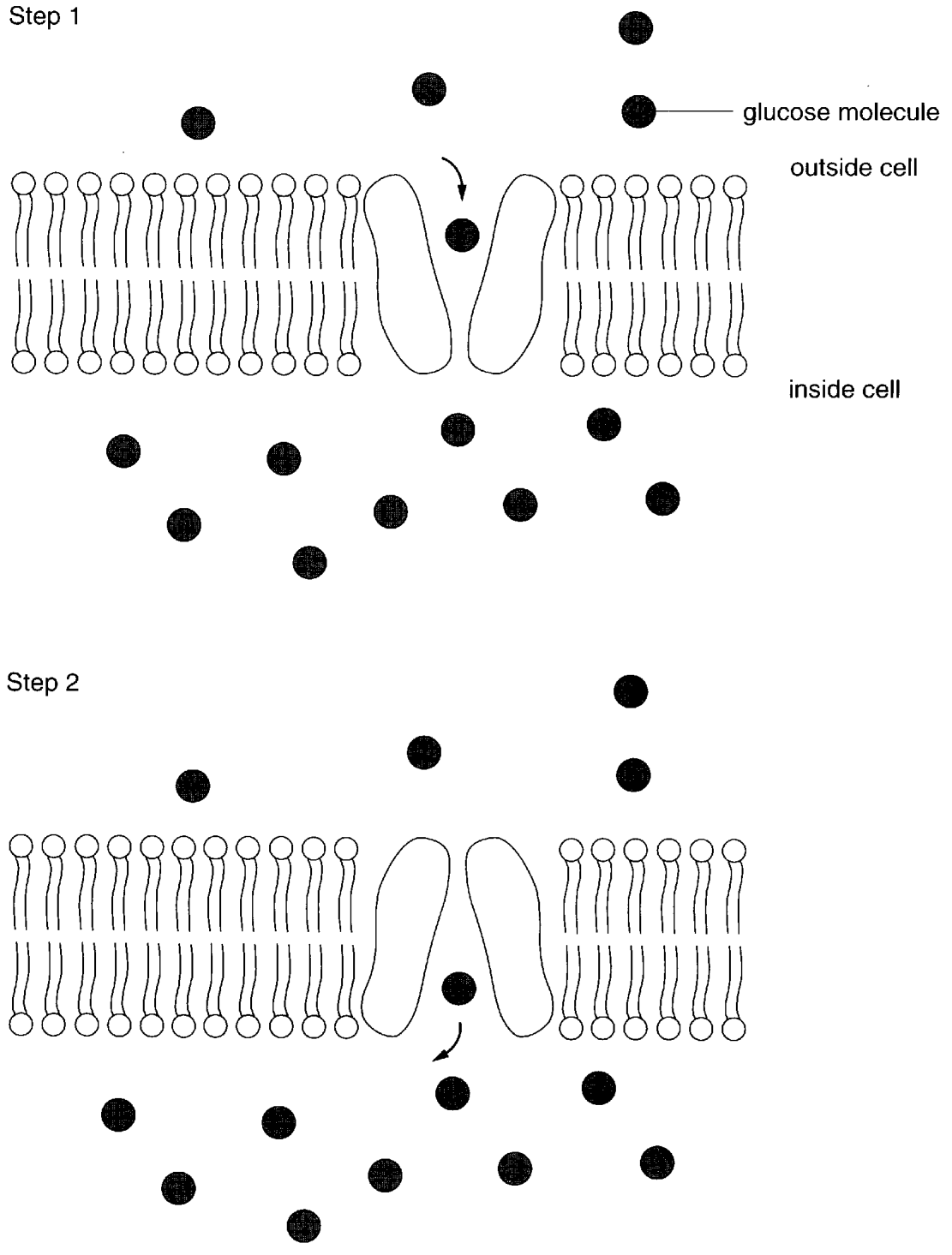

Fig. 6.1

(i) Name the process by which glucose is being transported across the membrane in Fig. 6.1.

..... [1]

(ii) State why glucose molecules cannot move through a phospholipid bilayer.

.....

..... [1]

(b) The rate of glucose uptake into animal cells can vary.

Suggest **two** changes in plasma (cell surface) membranes that could result in an increase in the rate of glucose uptake.

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.....

.....

..... [2]

[Total: 4]