OCR
RECOGNISING ACHIEVEMENT

ADVANCED SUBSIDIARY GCE

2801

BIOLOGY

Biology Foundation

MONDAY 4 JUNE 2007

Morning

Time: 1 hour

Additional materials: Electronic calculator
Ruler (cm/mm)

Candidate Name

Centre Number

Candidate Number

INSTRUCTIONS TO CANDIDATES

- Write your name, Centre Number and Candidate Number in the boxes above.
- Answer **all** the questions.
- Use blue or black ink. Pencil may be used for graphs and diagrams only.
- Read each question carefully and make sure you know what you have to do before starting your answer.
- Do **not** write in the bar code.
- Do **not** write outside the box bordering each page.
- WRITE YOUR ANSWER TO EACH QUESTION IN THE SPACE PROVIDED. ANSWERS WRITTEN ELSEWHERE WILL NOT BE MARKED.

INFORMATION FOR CANDIDATES

- The number of marks for each question 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	7	
2	10	
3	13	
4	12	
5	10	
6	8	
TOTAL	60	

This document consists of **14** printed pages and **2** blank pages.

Answer **all** the questions.

1 **(a)** Fig. 1.1 is a drawing of a vertical section of part of a dicotyledonous leaf.

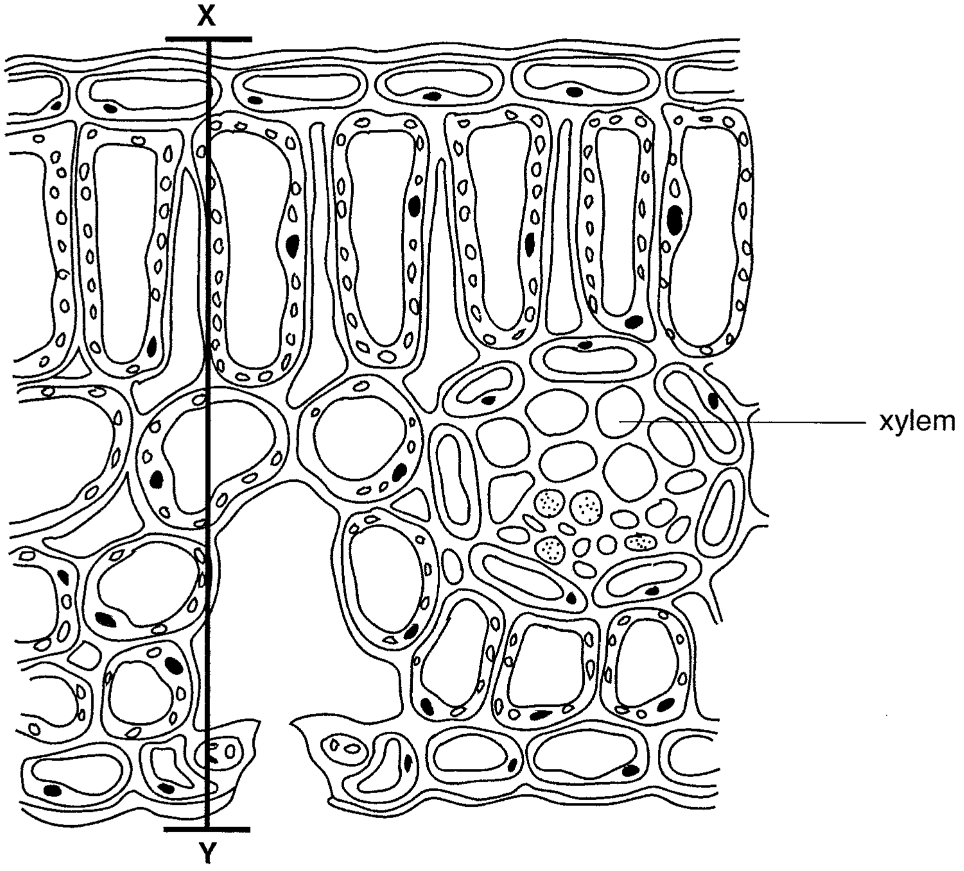

Fig. 1.1

(i) Use label lines and the letters **P**, **E** and **C** to indicate the following on Fig. 1.1.

P a palisade mesophyll cell

E a lower epidermal cell

C cuticle [3]

(ii) The distance **XY** represents an actual distance of 0.7 mm.

Calculate the magnification of the drawing. Show your working.

Answer = ... [2]

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(b) Explain why xylem is described as a *tissue*.

....

....

....

.... [2]

[Total: 7]

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2 **(a)** The table below shows six statements that apply to biochemical tests.

Complete the table to show which of these statements apply to the biochemical tests carried out on the substances listed.

Fill in each box using a tick (✓) to show that the statement applies or a cross (✗) if it does not. The first row has been completed for you.

	statement					
substance	use heat	use biuret reagent	use Benedict's reagent	boil with a dilute acid	a positive result is a blue-black colour	a positive result is an emulsion
lipid	✗	✗	✗	✗	✗	✓
protein						
starch						
reducing sugar						
non-reducing sugar						

[4]

(b) A sucrose molecule is a carbohydrate molecule made by joining a glucose unit to a fructose unit.

(i) Name the bond that joins the units in a molecule of sucrose.

.... [1]

(ii) Name the type of reaction that **breaks** this bond.

.... [1]

(c) Sucralose is a chemical that is similar in structure to sucrose. It has been made from sucrose by replacing three of the OH (hydroxyl) groups with C*l* (chlorine) atoms.

Fig. 2.1 shows a molecule of sucralose.

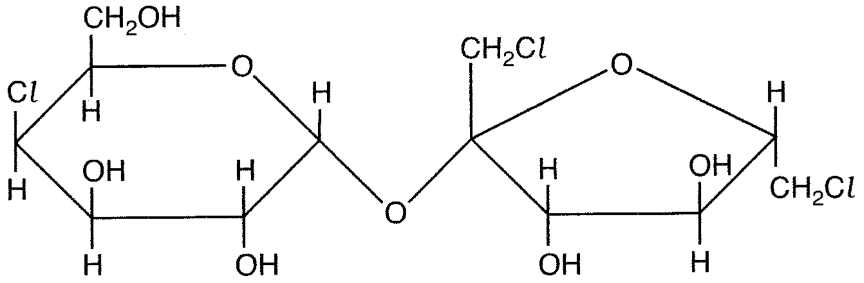

Fig. 2.1

The following claim is made for sucralose:

> Sucralose has the same sweet taste as sucrose.
>
> It cannot be digested by enzyme action in the human body and so it does not lead to weight increase.

Using the information in Fig. 2.1 to help you, suggest why sucralose cannot be digested in the body.

....

....

....

....

....

....

....

.... [4]

[Total: 10]

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3 **(a)** Part of the **DNA** base sequence coding for a protein is shown below.

A T G G C C T A A G T G

(i) State the corresponding base sequence of **mRNA**.

.... [2]

(ii) Name the process by which the DNA code is transferred to mRNA.

.... [1]

(b) Fig. 3.1 is a diagram that shows the stage in protein synthesis when amino acids are joined in the correct sequence to make the primary structure of the protein.

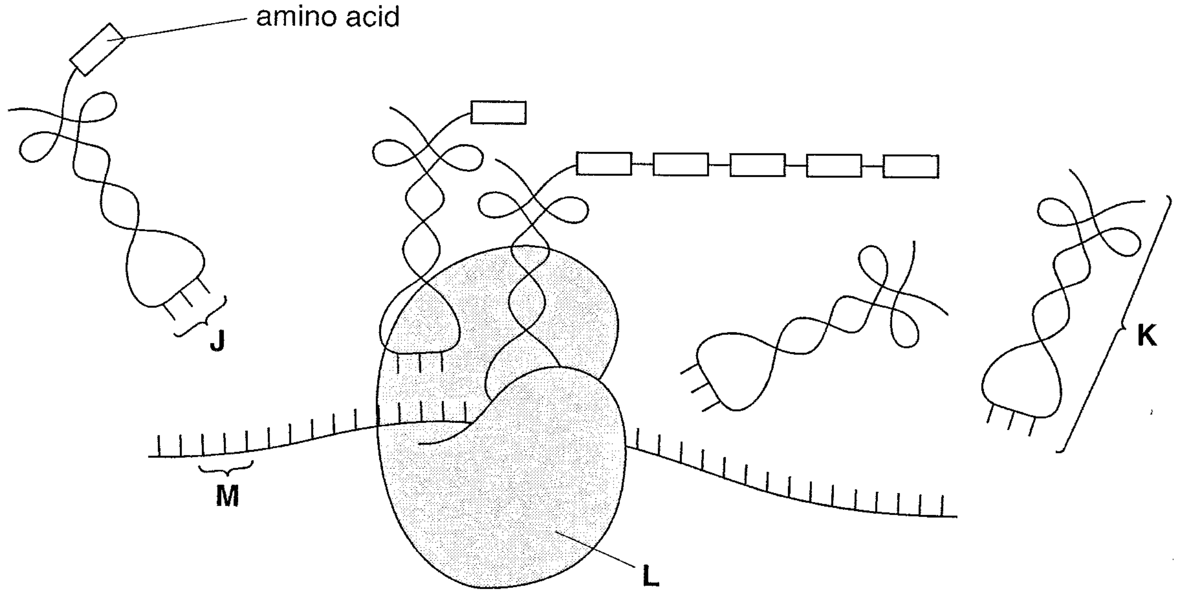

Fig. 3.1

(i) Name **J** to **M**.

The group of bases at **J** ....

K ....

L ....

The group of bases at **M** .... [4]

(ii) Using the information in Fig. 3.1 to help you, explain how amino acids become arranged into the correct sequence in the primary structure of the protein.

....

....

....

....

....

....

....

....

....

.... [4]

(c) Mistletoe is a parasitic plant that produces lectin 1, a ribosome-inactivating protein. Lectin 1 inhibits protein synthesis in the cells of the host plant.

Suggest how lectin 1 could inhibit protein synthesis.

....

....

....

.... [2]

[Total: 13]

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4 **(a)** Complete the table to show **three** ways in which prokaryotic and eukaryotic organisms differ in the **structure** of their cells.

prokaryotic	eukaryotic
1	....
2	....
3	....

[3]

(b) In this question, one mark is available for the quality of the use and organisation of scientific terms.

People who have one form of diabetes are unable to make insulin. In order to control blood sugar concentration, these people need to receive insulin. Originally, insulin was obtained from animals, such as pigs. Now, bacteria are transformed by genetic engineering to make proteins, such as insulin. This is the source of the majority of insulin now used by diabetics.

Describe how genetic engineering has been used to produce human insulin **and** the advantages of obtaining insulin in this way.

....

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....

....

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....

....

[8]

Quality of Written Communication [1]

[Total: 12]

5 (a) Name the stage of the mitotic cell cycle in which each of the following takes place:

(i) chromosomes become visible as two chromatids

.... [1]

(ii) DNA replicates

.... [1]

(iii) nuclear envelope reforms.

.... [1]

(b) During mitosis, chromosomes line up at the equator of the cell.

Describe what happens to chromosomes after this, until the nuclear envelope reforms.

....

....

....

....

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....

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....

....

.... [4]

(c) Fig. 5.1 shows the life cycles of two organisms, **A** and **B**.

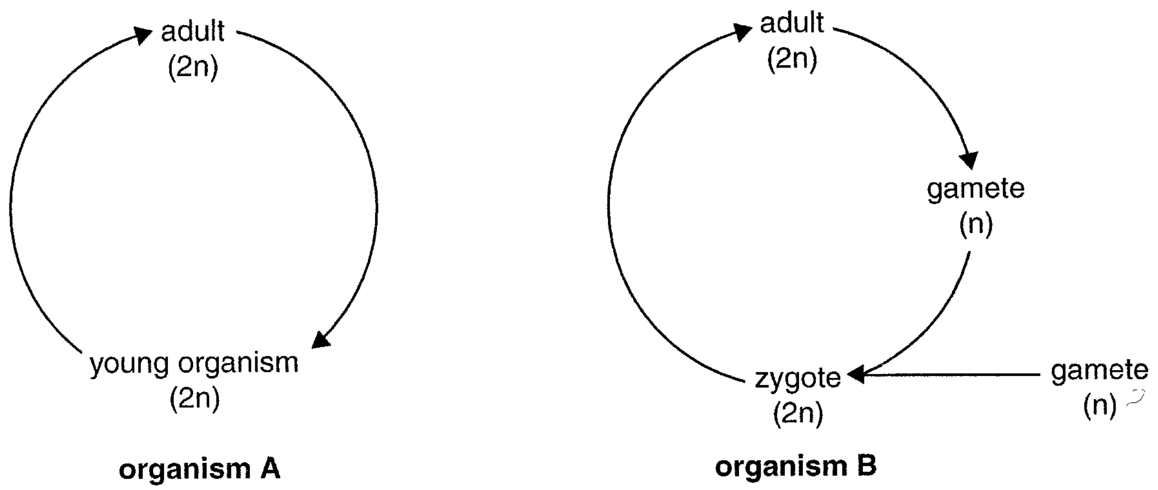

Fig. 5.1

(i) Name the type of reproduction taking place in the life cycle of organism **A**.

.... [1]

(ii) Explain why it is important that the gametes in the life cycle of organism **B** contain the haploid number of chromosomes.

....

....

....

.... [2]

[Total: 10]

6 Plants rely on the cycling of nitrogen to supply them with nitrogen in a form that they can absorb.

(a) Select, from the list, the most suitable word or term that matches the statements **(i)** to **(iv)** below.

active transport	**nitrogen fixation**
denitrification	***Nitrobacter***
denitrifying bacterium	***Nitrosomonas***
diffusion	**osmosis**
endocytosis	***Rhizobium***
nitrification	

(i) The conversion of nitrate ions into nitrogen gas.

.... [1]

(ii) A bacterium that fixes nitrogen.

.... [1]

(iii) A method by which nitrate ions pass into root hair cells.

.... [1]

(iv) The conversion of ammonium ions into nitrite ions.

.... [1]

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(b) Before the widespread use of artificial fertilisers, farmers used a variety of methods to improve the fertility of the soil and so improve the yield of their crops. Two of the methods in common use were:

- **Ploughing-in**
  In which legumes, such as beans, alfalfa or clover, were grown in a field and then harvested. The roots were then ploughed back into the soil rather than being dug up or burnt.

- **Crop rotation**
  In which different crops were grown in a field in each year for three years. In the fourth year, the 'fallow' year, the field was not used for crops. In the following year the crop cycle was started again.

Explain how ploughing-in and crop rotation are able to improve the fertility of the soil.

Ploughing-in ....

....

....

....

....

Crop rotation ....

....

....

....

.... [4]

[Total: 8]

END OF QUESTION PAPER

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