OCR
RECOGNISING ACHIEVEMENT

OXFORD CAMBRIDGE AND RSA EXAMINATIONS
Advanced Subsidiary GCE

BIOLOGY 2801

Biology Foundation

Tuesday **5 JUNE 2001** Afternoon 1 hour 30 minutes

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

Candidate Name	Centre Number	Candidate Number

TIME 1 hour 30 minutes

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 and make sure you know what you have to do before starting your answer.

INFORMATION FOR CANDIDATES

- The number of marks is given in brackets [ ] at the end of each question or part question.
- The total number of marks for this paper is 90.
- You will be awarded marks for the quality of written communication where an answer requires a piece of extended writing.
- You may use an electronic calculator.
- You are advised to show all the steps in calculations.

FOR EXAMINER'S USE		
Qu.	**Max.**	**Mark**
1	7	
2	11	
3	17	
4	15	
5	13	
6	12	
7	15	
TOTAL	**90**	

This question paper consists of 17 printed pages and 3 blank pages.

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For Examiner's Use

Answer **all** questions.

1 Fig. 1.1 is an electron micrograph of part of a leaf mesophyll cell.

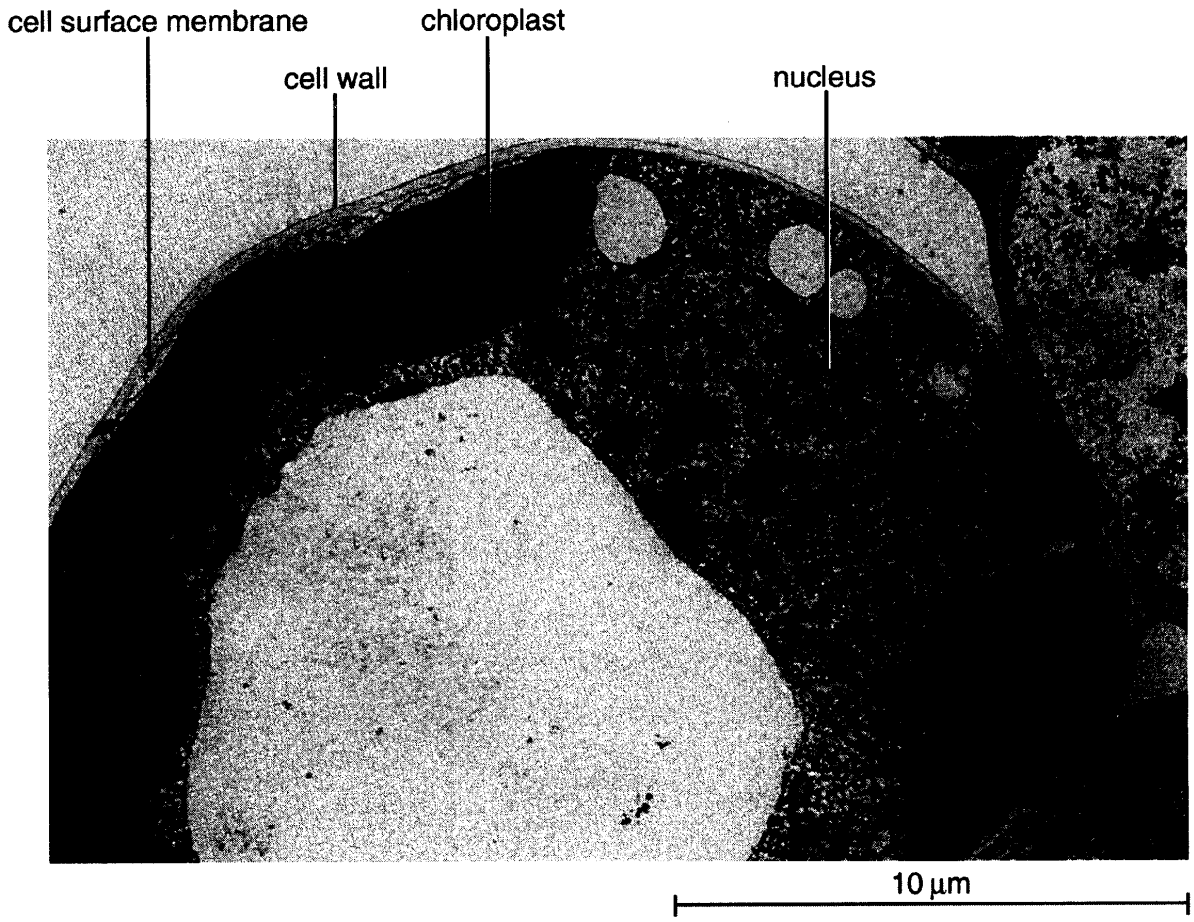

Fig. 1.1

(a) With reference to Fig. 1.1, state **two** reasons why the cell is considered to be a eukaryotic cell.

1. .....

.....

2. .....

.....[2]

(b) State the functions of the following structures in this cell

(i) chloroplast;

.....

.....[1]

(ii) cell surface membrane.

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.....[1]

(c) Calculate the magnification of Fig. 1.1. (Show your working.)

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.....[2]

(d) State **one** way in which a typical animal cell differs from the cell shown in Fig. 1.1.

.....[1]

[Total : 7]

2 Organisms, both plants and animals, are able to exist together in the same environment. They interact, both with members of their own species and with other species.

(a) State the word or phrase which best describes each of the following.

(i) The place where an organism lives.

.....[1]

(ii) A number of **different** species interacting in a particular place.

.....[1]

(iii) All members of the **same** species in a particular place.

.....[1]

(iv) The ecological role of an organism.

.....[1]

(v) The first trophic level in **all** food chains.

.....[1]

(vi) A natural unit of living and non-living parts, interacting to produce a stable system.

.....[1]

Some farmers spread waste from sewage works on their fields. This waste contains nitrogen compounds such as protein, urea and ammonia.

(b) **(i)** Describe how the nitrogen compounds present in the sewage waste are converted naturally into a form which can be taken up by the plants in the fields.

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.....[4]

For Examiner's Use

(ii) Suggest a possible **disadvantage** of spreading this waste on the fields.

.....

.....[1]

[Total : 11]

For Examiner's Use

3 **(a)** State **one** role for each of the following **in** living organisms.

(i) calcium

.....[1]

(ii) magnesium

.....[1]

(iii) phosphate

.....[1]

(iv) sodium

.....[1]

(v) water

.....[1]

A solution is thought to contain both sucrose and glucose. A student carried out a test and confirmed that a small amount of glucose was present in the solution.

(b) Describe how the student could determine that the solution also contains sucrose.

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.....[4]

For Examiner's Use

(c) Describe the molecular structure of starch (amylose and amylopectin).
(In this question, 1 mark is available for the quality of written communication.)

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.....[8]

[Total : 17]

4 The enzyme urease catalyses the following reaction:

urea + water → ammonium carbonate

Ammonium carbonate readily gives off ammonia.

The indicator bromo-thymol blue is yellow in neutral solution and blue in alkaline solution. In an investigation, urease was mixed with bromo-thymol blue. The mixture was divided equally between five test-tubes, labelled **A** to **E**. One test-tube was placed in each of five water baths at the temperatures shown in Table 4.1, until they reached the desired temperature. The same mass of urea was then added to each test-tube. The test-tubes were maintained at their temperatures and the time taken for the contents of each test-tube to turn blue was recorded.

The results of the investigation are shown in Table 4.1.

Table 4.1

test-tube	temperature / °C	time taken for blue colour to appear / sec
A	0	89
B	15	21
C	35	5
D	45	17
E	55	33

(a) Suggest why the indicator changed colour after urea was added to the enzyme.

.....

.....

.....[1]

(b) With reference to Table 4.1,

(i) state what you can conclude about the optimum temperature of the enzyme;

.....[1]

(ii) explain the fact that the **time taken** for the blue colour to appear is greater at 15 °C than at 35 °C and is greater at 55 °C than at 35 °C.

greater at 15 °C than at 35 °C

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greater at 55 °C than at 35 °C

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.....[4]

The indicator was added to a separate sample of urea and to a separate sample of urease. In neither test tube was a blue colour produced.

(c) Explain why the indicator was added to separate samples of both urea and urease.

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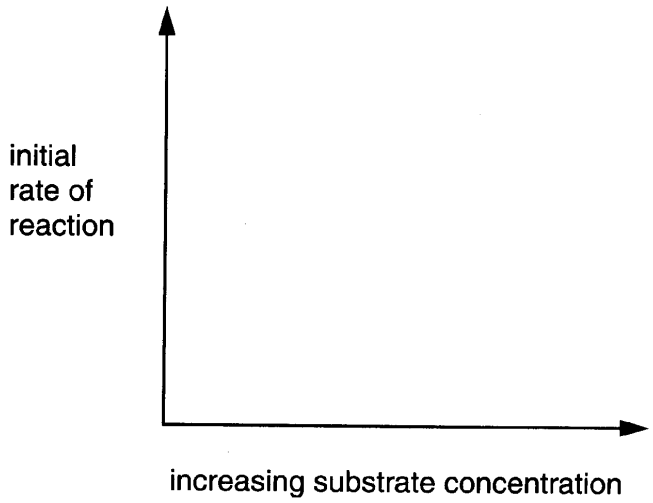
.....[2]

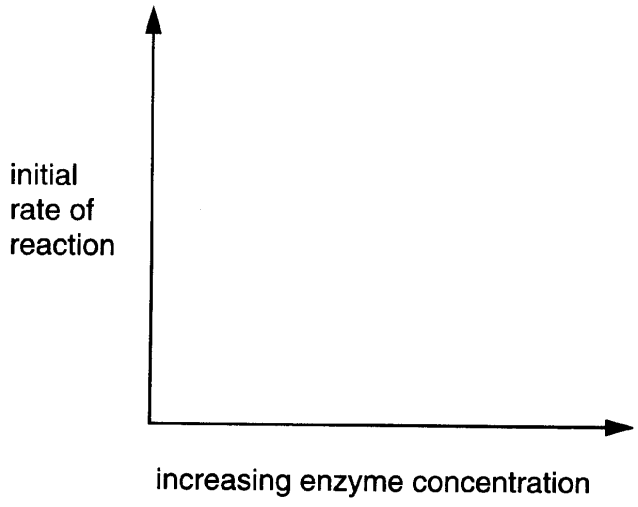
(d) On the axes provided, sketch the curves you would expect if an enzyme-controlled reaction was carried out under optimum conditions with

(i) a fixed quantity of enzyme;



[2]

(ii) excess substrate.



[1]

Fig. 4.1 represents an enzyme, its substrate and a **non-competitive** inhibitor.

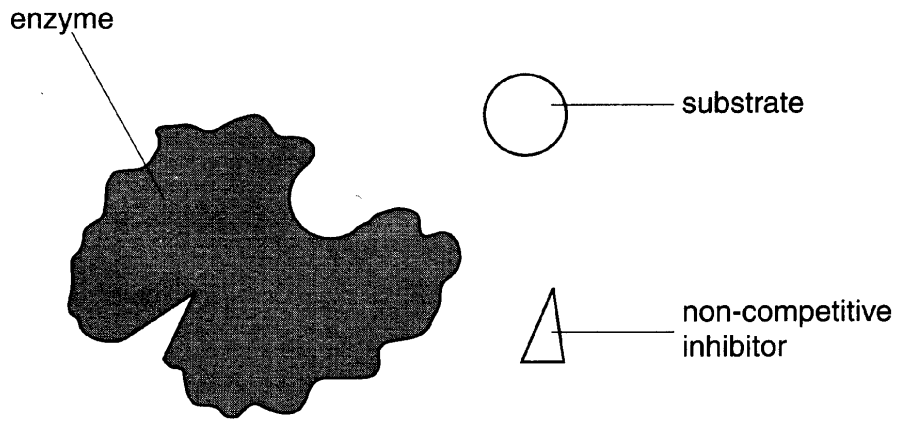


Fig. 4.1

(e) With reference to Fig. 4.1,

(i) label the active site; [1]

(ii) explain how the inhibitor has its effect.

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.....

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.....[3]

[Total : 15]

5 The gaseous exchange surface of the mammalian lung possesses a number of features which allow efficient diffusion.

(a) State how each of the following features assists in producing an efficient gaseous exchange system.

(i) The surface is composed of many alveoli.

.....

.....[1]

(ii) The wall of each alveolus is 0.1 μm thick.

.....

.....[1]

(iii) A dense network of capillaries covers the outside of each alveolus.

.....

.....[1]

(iv) The surface is well ventilated.

.....

.....[1]

Root hairs absorb water and ions.

(b) State **two** features of root hairs which allow efficient absorption.

1. .....

2. .....[2]

Substances cross the membranes of root hairs by a number of different methods, including osmosis and active transport.

(c) Describe the processes of osmosis and active transport, highlighting the differences between them.
(In this question, 1 mark is available for the quality of written communication.)

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[Total : 13]

For Examiner's Use

6 Fig. 6.1 indicates the appearance of a chromosome at early prophase of mitosis.

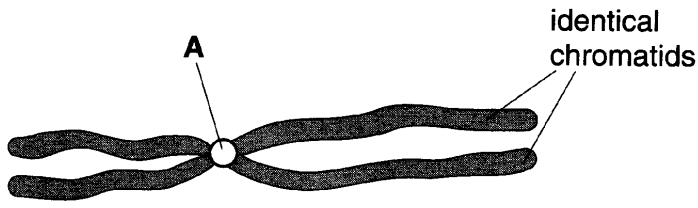

Fig. 6.1

(a) With reference to Fig. 6.1,

(i) name the structure labelled **A**;

.....[1]

(ii) explain why the two chromatids are identical.

.....

.....

.....

.....[2]

Fig. 6.2 represents the nucleus of an animal cell (2n = 6) at early prophase of mitosis.

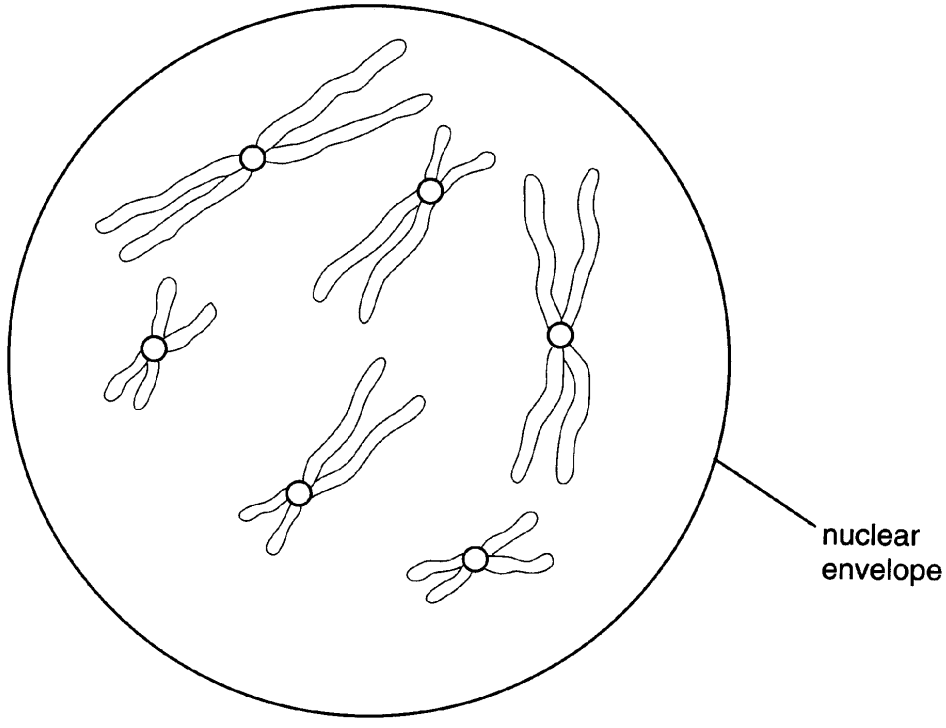

Fig. 6.2

(b) On Fig. 6.2, shade **one** pair of homologous chromosomes. [1]

(c) In the space below, draw an annotated diagram to indicate what happens in this cell at anaphase of mitosis.

[4]

(d) **(i)** State the number of chromosomes which would be found in a **haploid** cell in this animal.

.....[1]

(ii) Explain why haploid cells need to be produced during a life cycle which includes sexual reproduction.

.....

.....

.....

.....

.....[3]

[Total : 12]

[Turn over

For Examiner's Use

7 **(a)** **(i)** Name the sugar in DNA.

.....[1]

(ii) State how many carbon atoms this sugar contains.

.....[1]

(b) State the **name** of the nitrogenous base which

(i) is present in DNA but not in RNA;

.....[1]

(ii) is present in RNA but not in DNA.

.....[1]

Fig. 7.1 represents part of the process of protein synthesis.

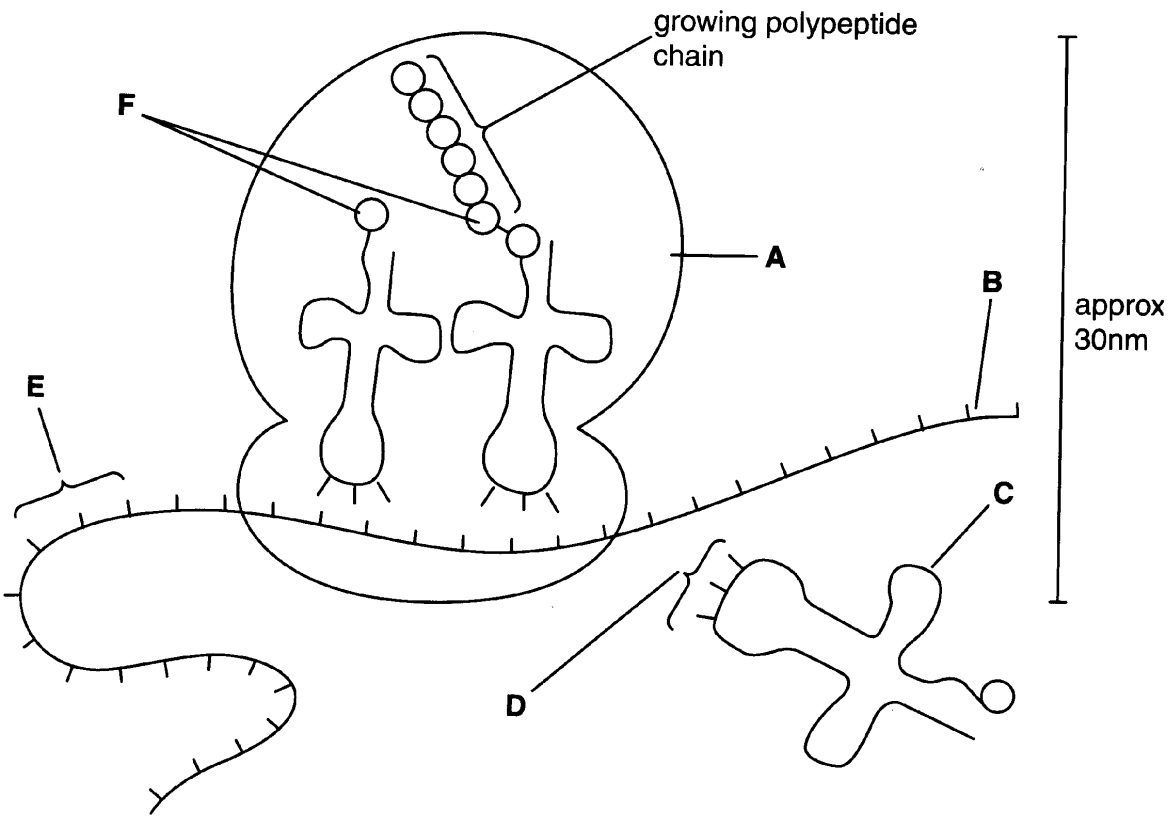

Fig. 7.1

(c) With reference to Fig. 7.1, name

(i) the type of RNA present in the structure labelled **A**;

.....[1]

(ii) the two types of RNA labelled **B** and **C**;

B .....

C .....[2]

(iii) structures **D** to **F**;

D .....

E .....

F .....[3]

(iv) the bond linking the structures labelled **F** in the polypeptide chain.

.....[1]

(d) Explain how the sequence of bases in DNA determines the order of amino acids in a polypeptide chain.

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.....[4]

[Total : 15]

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