Centre Number	Candidate Number	Name

UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
General Certificate of Education Advanced Level

BIOLOGY **9700/04**

Paper 4 Structured Questions A2 Core

May/June 2006

1 hour 15 minutes

Candidates answer on the Question Paper.
Additional Materials: Answer Paper (should be available on request.)

READ THESE INSTRUCTIONS FIRST

Write your Centre number, candidate number and name on all the work you hand in.
Write in dark blue or black pen.
You may use a pencil for any diagrams, graphs, or rough working.
Do not use staples, paper clips, highlighters, glue or correction fluid.

Answer **all** questions in Section A and **one** question from Section B.
Circle the number of the Section B question you have answered in the grid below.

At the end of the examination, fasten all your work securely together.
The number of marks is given in brackets [ ] at the end of each question or part question.

For Examiner's Use	
1	
2	
3	
4	
5	
Section A	
6 or 7	
TOTAL	

This document consists of **10** printed pages and **2** lined pages.

Section A

Answer **all** the questions.

1 The metabolic pathway in which a hexose sugar, such as glucose, is broken down in respiration by cells starts with glycolysis. Fig. 1.1 outlines the key stages of glycolysis.

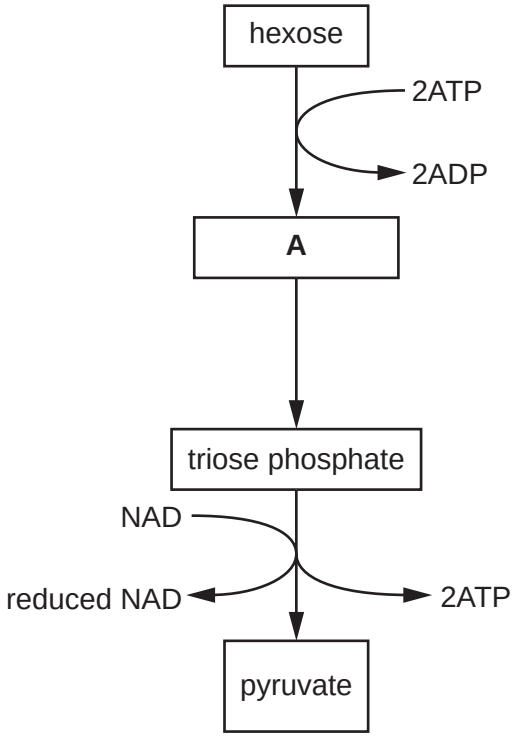

Fig. 1.1

(a) State where in the cell glycolysis takes place.

.....[1]

(b) Name substance **A**.

.....[1]

(c) Explain why the hexose is converted to substance **A**.

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.....[2]

(d) Briefly describe what happens to pyruvate if **yeast** is deprived of oxygen.

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.....[4]

[Total: 8]

2 Fig. 2.1 shows the results of experiments investigating the effect of different light intensities on the rate of photosynthesis of cucumber plants measured as mm^3 CO_2 uptake per cm^2 leaf area per hour. The experiments were carried out at two different temperatures and two different carbon dioxide concentrations.

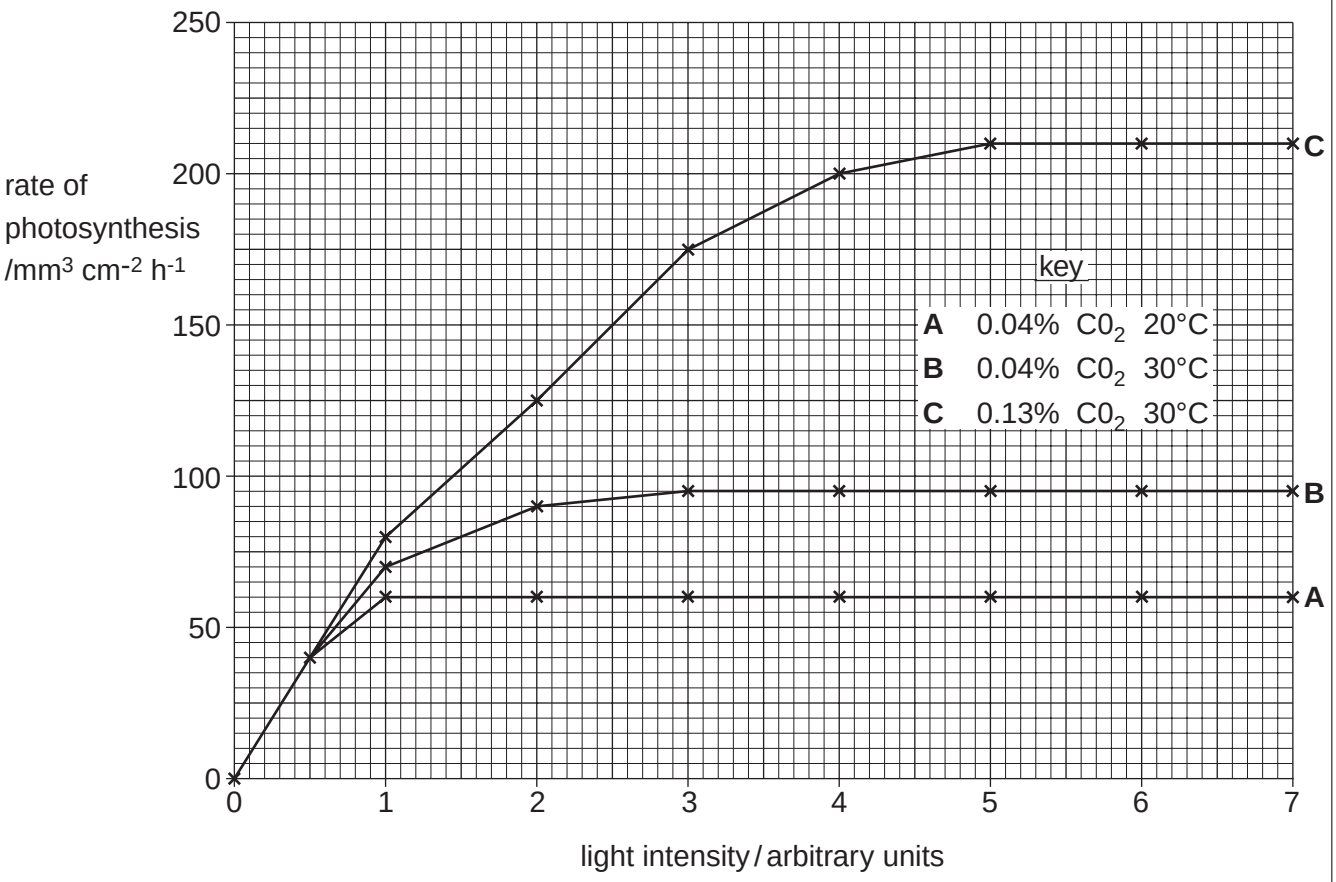

Fig. 2.1

(a) With reference to Fig. 2.1,

(i) describe the shape of curve **A**,

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.....[3]

(ii) explain the reasons for the difference between curves **B** and **C**.

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.....[4]

(b) Suggest **two** ways in which a commercial grower of cucumbers may increase the yield of the growing crop.

1 .....

.....

2 .....

.....[2]

[Total: 9]

3 During the process of the excretion of nitrogenous waste in mammals, blood passes from the renal artery into networks of capillaries called glomeruli.
Fig. 3.1 is an electronmicrograph showing the relationship between the capillaries and the renal capsule cells, called podocytes.

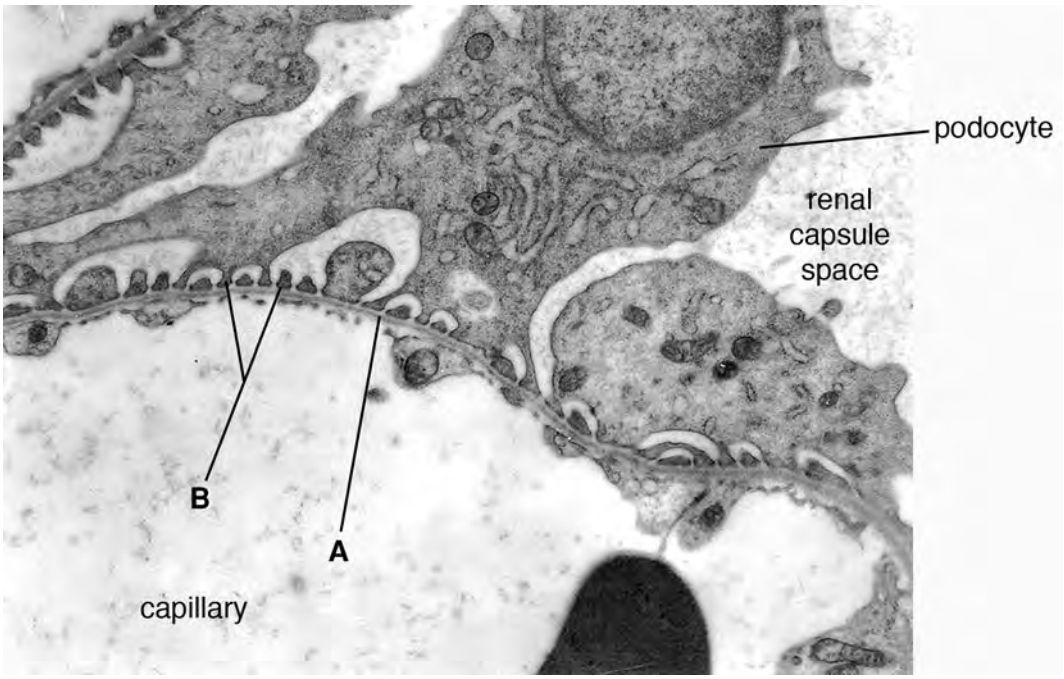

Fig. 3.1

(a) Name structures **A** and **B**.

A .....

B ..... [2]

(b) Draw an arrow, on Fig. 3.1, to show the passage of fluid out of the capillary. [2]

(c) **(i)** Name the fluid that collects in the capsular space.

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.....[1]

(ii) Describe how the composition of this fluid differs from blood plasma.

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.....[2]

(d) Ultrafiltration involves the removal of small molecules, including urea, from the blood into the renal capsule. Explain what is required for ultrafiltration to occur.

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.....[3]

[Total: 10]

4 **(a)** Name the transmitter which is responsible for the transmission of nerve impulses across a cholinergic synapse.

.....[1]

(b) Outline the role of calcium ions in synaptic transmission.

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.....[4]

(c) Explain how a synapse ensures one-way transmission of nerve impulses.

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.....[2]

[Total: 7]

5 **(a)** The summer squash plant produces fruit that are either white or yellow in colour and are either shaped like a disc or a sphere. The dominant phenotypes are white and disc-shaped fruit. Using the symbols **A** for white and **a** for yellow and **B** for disc and **b** for sphere, draw a genetic diagram to show what proportion of offspring will have yellow and sphere-shaped fruit if a white and disc-shaped fruit plant, heterozygous for both genes, is self-fertilised.

[6]

Sickle cell anaemia is a blood disease that is frequently fatal when homozygous. It is caused by an autosomal recessive allele. Heterozygotes have sickle cell trait and appear normal.

Malaria is a potentially fatal infectious disease of the blood caused by the protoctist, *Plasmodium*. In parts of the world where malaria is endemic the frequency of the sickle cell allele is high.

(b) Explain the possible health consequences, in such areas, for a person who is homozygous dominant and for a person who is homozygous recessive for the sickle cell allele.

(i) homozygous dominant for the sickle cell allele

.....

.....[1]

(ii) homozygous recessive for the sickle cell allele.

.....

.....[1]

(c) Explain why heterozygotes have a strong selective advantage in areas where malaria occurs.

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.....[3]

[Total: 11]

For Examiner's Use

Section B

Answer **one** question.

6 **(a)** Explain the meaning of the term **homeostasis** with specific reference to the control of **raised** blood glucose concentration in mammals. [8]

(b) Describe the role played by ADH in osmoregulation in mammals. [7]

[Total: 15]

7 **(a)** Describe the role of natural selection in evolution. [8]

(b) Explain, using **named** examples, how mutation can affect phenotype. [7]

[Total: 15]