



UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS  
 General Certificate of Education  
 Advanced Subsidiary Level and Advanced Level

CANDIDATE  
 NAME

CENTRE  
 NUMBER

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CANDIDATE  
 NUMBER

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**BIOLOGY**

**9700/22**

Paper 2 Structured Questions AS

**October/November 2011**

**1 hour 15 minutes**

Candidates answer on the Question Paper.

No Additional Materials are required.

**READ THESE INSTRUCTIONS FIRST**

Write your Centre number, candidate number and name in the spaces provided at the top of this page.

Write in dark blue or black ink.

You may use a soft pencil for any diagrams, graphs, or rough working.

Do not use staples, paper clips, highlighters, glue or correction fluid.

DO **NOT** WRITE IN ANY BARCODES.

Answer **all** questions.

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	
6	
<b>Total</b>	

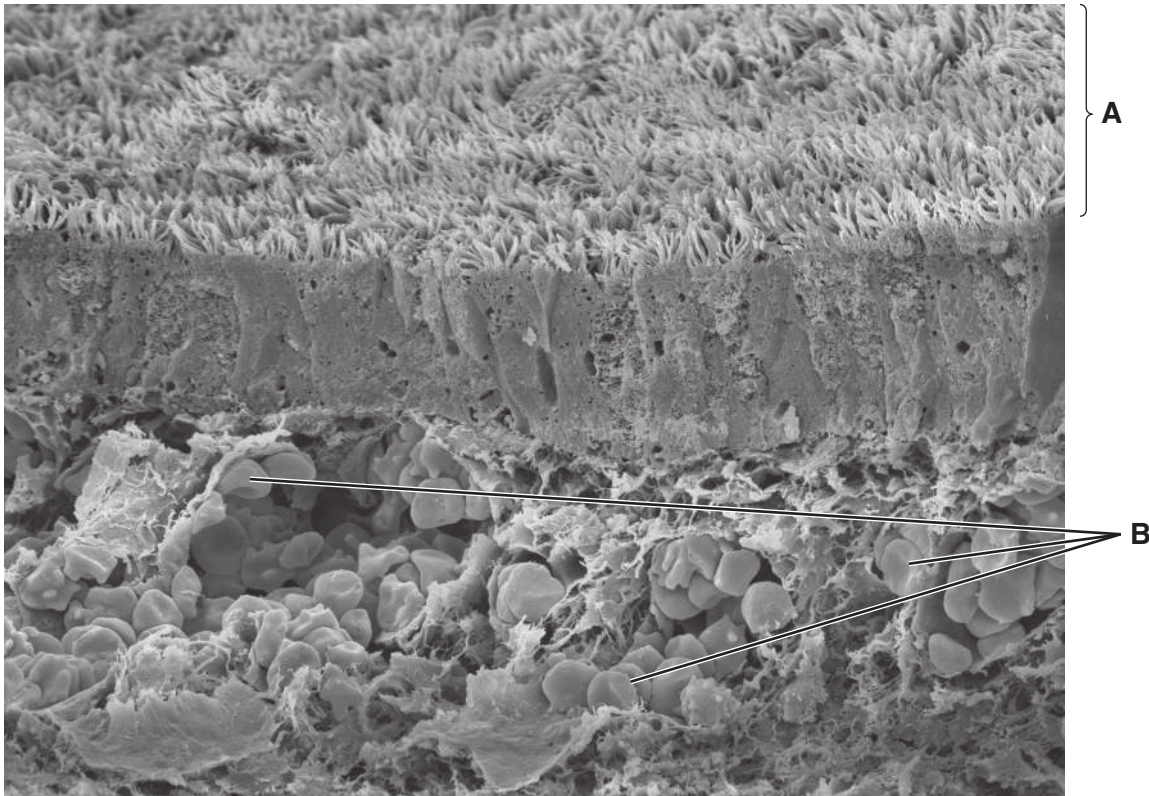
This document consists of **11** printed pages and **1** blank page.



Answer **all** the questions.

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Use

- 1 Fig. 1.1 is a scanning electron micrograph of part of the wall of the bronchus of a healthy human.



**Fig. 1.1**

- (a) (i) Name the structures labelled **A**.

.....[1]

- (ii) State the function of the cells labelled **B**.

.....[1]

- (b) Name two tissues found in the wall of the bronchus that are not visible in Fig. 1.1.

1. ....

2. ....[2]



2 (a) White blood cells play an important role in defence.

State precisely the type of white blood cell that fits each of the descriptions given in (i) to (iv).

(i) It is formed in the bone marrow and matures from a monocyte. It contains many lysosomes with hydrolytic enzymes.

.....[1]

(ii) It is formed, and matures in, the bone marrow. It contains a lobed nucleus and has the ability to ingest microorganisms by endocytosis.

.....[1]

(iii) When activated, it differentiates into a cell that secretes a chemical, which causes other cells to lyse (burst). It contains a large, spherical nucleus.

.....[1]

(iv) It is formed as a result of a primary immune response and remains in the body. On activation, it has the potential to produce antibodies during a secondary immune response.

.....[1]

(b) In 1980, it was announced that the highly infectious viral disease, smallpox, had been eradicated. This was mainly due to a worldwide vaccination programme planned by the World Health Organization (WHO).

Attempts have been made to control other diseases, such as measles, sickle cell anaemia and cholera, without the same success as smallpox.

(i) Define the term *disease*.

.....  
.....  
.....  
.....  
.....[2]

(ii) Describe two features of the vaccine that contributed to the success of the smallpox eradication programme.

1. ....  
.....  
.....

2. ....  
.....  
.....[2]

(iii) Discuss the reasons why vaccination has **not** eradicated cholera **and** sickle cell anaemia.

*cholera* .....  
.....  
.....  
.....  
.....  
.....  
.....  
.....  
.....

*sickle cell anaemia* .....  
.....  
.....  
.....  
.....  
.....  
.....  
.....  
.....[5]

[Total: 13]



(b) Table 3.1 shows the various types of nitrogen fixation that occur throughout the world and gives estimates of the mass of atmospheric nitrogen fixed in a year.

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**Table 3.1**

type of nitrogen fixation		mass of nitrogen fixed / $\times 10^9 \text{ kg yr}^{-1}$
non-biological	Haber process	50
	combustion	20
	lightning	10
biological	agricultural land	90
	non-agricultural land	50
	sea	35

(i) Using data from Table 3.1, calculate the percentage of nitrogen fixation carried out worldwide by nitrogen-fixing organisms, such as *A. vinelandii*, in **agricultural land**.

Show your working and express your answer to the nearest whole number.

answer .....% [2]

(ii) Explain why the proportion of nitrogen gas in the atmosphere remains stable at 78%, even though nitrogen fixation removes nitrogen gas from the atmosphere.

.....  
 .....  
 .....  
 ..... [2]

(c) Describe **and** explain the benefits to humans of the presence of nitrogen-fixing bacteria, such as *A. vinelandii*, in agricultural land.

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

[Total: 12]

**[Turn over**

- 4 (a) Fig. 4.1 shows the structure of deoxyribose sugar.

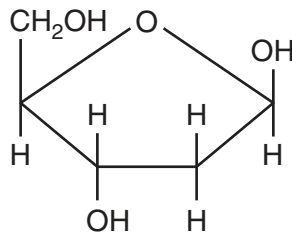


Fig. 4.1

State the differences between the structure of deoxyribose shown in Fig. 4.1 and the ring structure of  $\alpha$ -glucose.

*You may use the space below to help you in your answer.*

.....

.....

.....

.....

[3]

- (b) Match the biological macromolecule with the type of bond that is formed when the molecule is synthesised. Choose from the list below.

**amylose    cellulose    triglyceride    protein    amylopectin    mRNA**

type of bond(s)	biological macromolecule
$\beta$ , 1-4 glycosidic	
$\alpha$ , 1-4 glycosidic <b>and</b> $\alpha$ , 1-6 glycosidic	
phosphodiester	
peptide	

[4]



Semi-conservative replication of DNA and transcription involve the formation of polynucleotide chains.

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(c) State the type of reaction that occurs in the formation of a polynucleotide chain.

.....[1]

(d) Complete Table 4.1 to show **four** differences between DNA replication and DNA transcription.

**Table 4.1**

	replication	transcription
1		
2		
3		
4		

[4]

[Total: 12]





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*Copyright Acknowledgements:*

Question 1, Fig. 1.1 © STEVE GSCHMEISSNER/SCIENCE PHOTO LIBRARY

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