



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

CANDIDATE  
NAME

CENTRE  
NUMBER

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NUMBER

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**BIOLOGY**

**9700/22**

Paper 2 Structured Questions AS

**October/November 2010**

**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 pen.

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	
<b>1</b>	
<b>2</b>	
<b>3</b>	
<b>4</b>	
<b>5</b>	
<b>6</b>	
<b>Total</b>	

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



Answer **all** the questions.

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Use

1 Protein production involves a complex sequence of events and a number of cell structures.

(a) The first column in Table 1.1 shows some of the events that occur in the production of a protein in a cell and its eventual release from the cell.

**Table 1.1**

event	sequence of events (numbers)	cell location (letters)
exocytosis		
protein modification		
secretory vesicle formation		
transcription		
translation		

(i) In Table 1.1, write the sequence in which the events occur, using **1** as the **first** process in the sequence. [2]

(ii) From the list **A** to **F** below, choose **one** cell location for each event and write the letter in Table 1.1. Each letter may be used once, more than once, or not at all.

- A** Golgi apparatus
- B** lysosome
- C** nucleus
- D** rough endoplasmic reticulum
- E** smooth endoplasmic reticulum
- F** plasma (cell surface) membrane

[3]

(b) Describe the process of *exocytosis*.

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

(c) One example of protein modification is the removal of the first amino acid, methionine, from a newly formed polypeptide chain to make a functioning protein.

(i) The DNA nucleotide sequence that specifies the amino acid methionine is TAC.

State the mRNA nucleotide sequence that is complementary to the DNA sequence for methionine.

..... [1]

(ii) Suggest **two** other ways in which the polypeptide chain is modified to produce the functioning protein.

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

[Total: 11]

2 Malaria is an infectious disease that is considered by the World Health Organization to be a disease of worldwide importance.

(a) Explain what is meant by the term *infectious*.

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

(b) Name **one** species of organism that causes malaria.

..... [1]

(c) Explain the significance of the following statements in the control of malaria.

(i) The female *Anopheles* mosquito has been more closely studied with regard to malaria than the male *Anopheles* mosquito.

.....  
..... [1]

(ii) The infective stages of the malarial organism are present in anti-coagulant produced by the mosquito.

.....  
..... [1]

(iii) After circulating in the blood for a short time, the pathogen enters liver cells of the newly infected person and then enters red blood cells.

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



3 (a) Enzymes are globular proteins that catalyse metabolic reactions.

Describe the features of globular proteins.

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

(b) Enzymes can be used to remove cell walls from plant and fungal cells. The cells are incubated in a solution that contains a mixture of enzymes.

(i) Suggest an explanation for the fact that a different mixture of enzymes is required to remove the walls of plant cells compared to the walls of fungal cells.

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

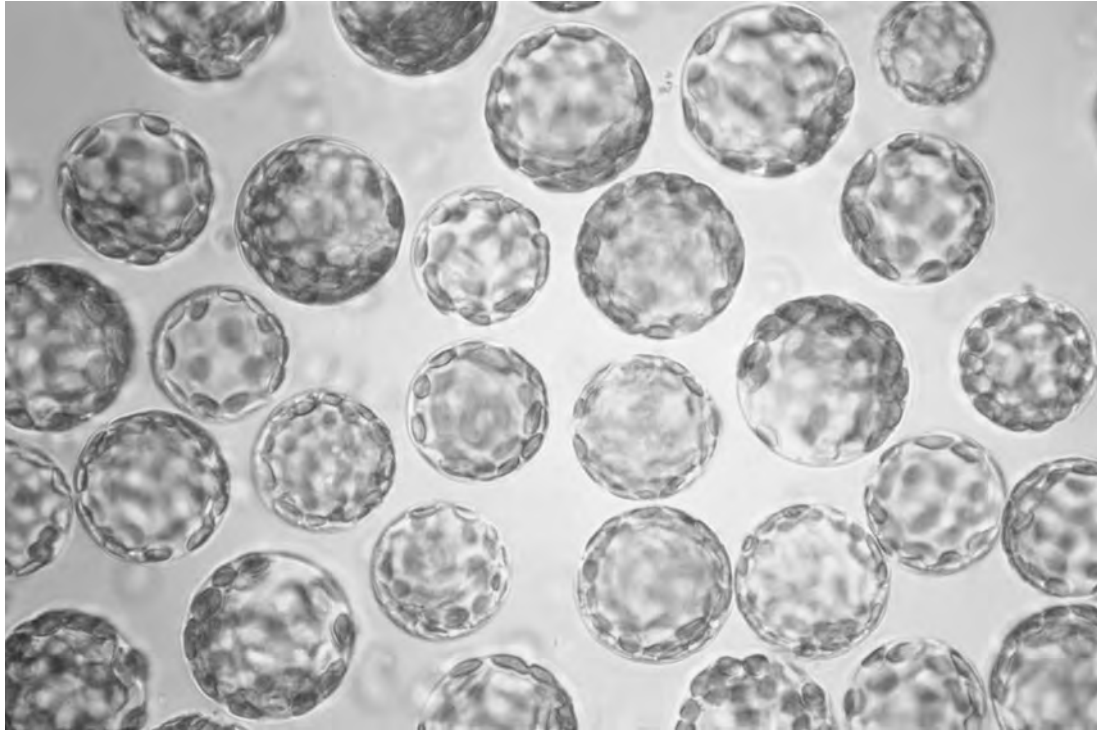
(ii) Explain why, when plant cells are incubated with enzymes to remove their cell walls, it is important to maintain an optimum pH.

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



- (d) The student also carried out a similar investigation using plant cells with cell walls removed. These cells were suspended in a 12% mannitol solution so that the water potential inside and outside of the cells was equal.

Fig. 3.1 is a photomicrograph of these cells.



**Fig. 3.1**

The student removed a sample of these cells. The sample was placed into distilled water and was viewed using a light microscope.

Describe what you would expect the student to observe and explain why this would not occur with normal plant cells.

.....

.....

.....

..... [2]

[Total: 14]



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- 4 Fig. 4.1 is an incomplete flow chart showing some of the events of the primary immune response that occur after a person has been given a vaccine.

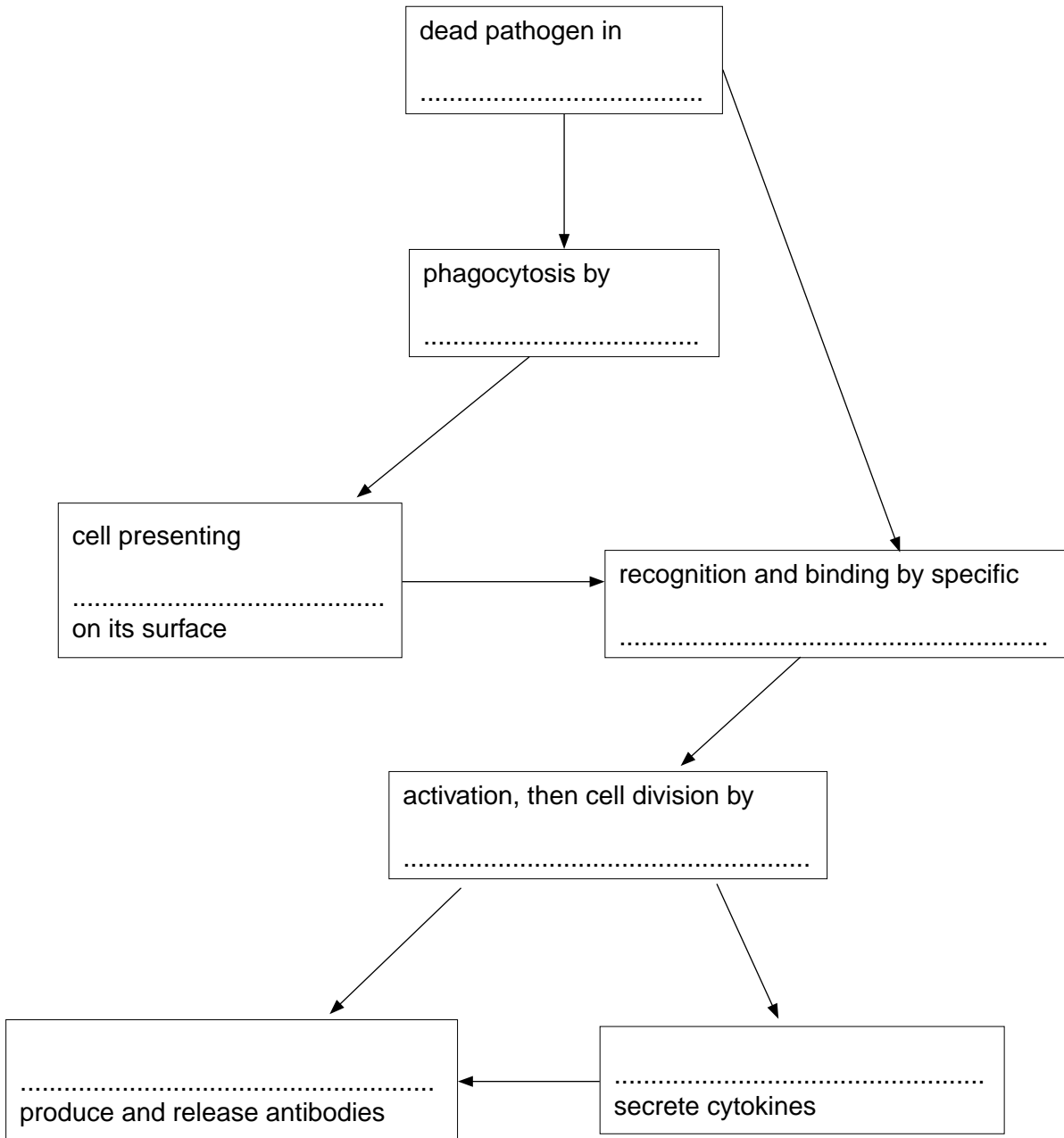


Fig. 4.1

- (a) Choose the correct term from the list below to complete Fig. 4.1.

<b>lymphocytes</b>	<b>antigens</b>	<b>mitosis</b>	<b>vaccine</b>
<b>T<sub>h</sub>-lymphocytes</b>	<b>plasma cells</b>	<b>macrophages</b>	

[3]



5 State the term that applies to each of the descriptions (a) to (e).

(a) Storage polysaccharide in animals made of chains of 1,4 linked  $\alpha$ -glucose with 1,6 linkages forming branches.

..... [1]

(b) A plant that has adaptations to enable it to live in areas where water is in short supply.

..... [1]

(c) Any cell containing one complete set of chromosomes.

..... [1]

(d) The name of the trophic level to which photosynthetic organisms belong.

..... [1]

(e) A process carried out by bacteria that involves the conversion of atmospheric nitrogen into nitrogenous compounds that can be used directly by plants.

..... [1]

[Total: 5]

6 Fig. 6.1 is a section through lung tissue showing an alveolus and its blood supply.

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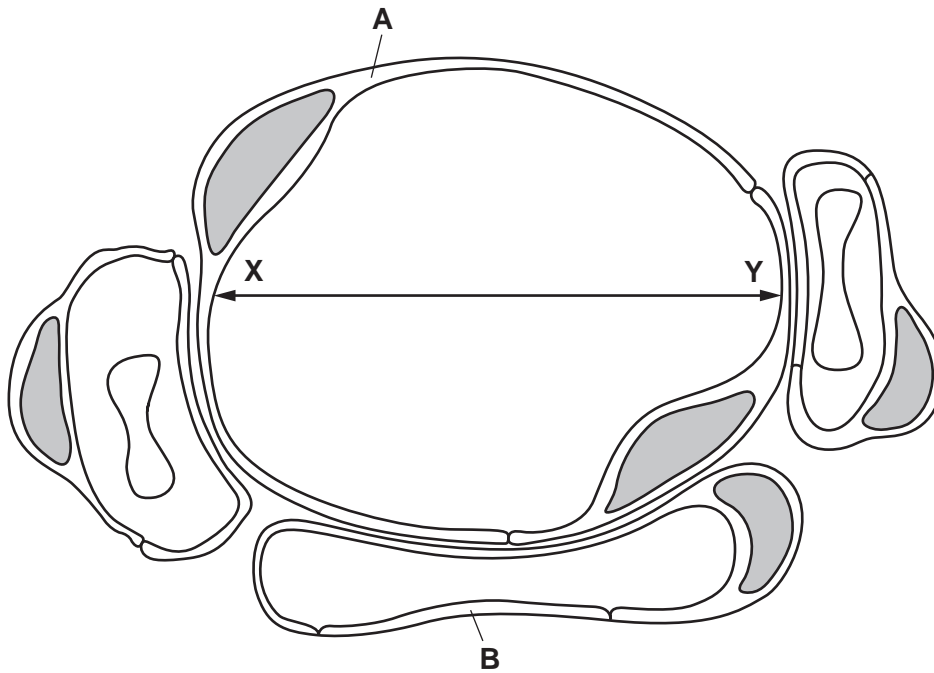


Fig. 6.1

(a) (i) Name the type of epithelial cell shown by label lines **A** and **B**.

..... [1]

(ii) Describe how the elastic fibres of the alveoli contribute to the healthy functioning of the lungs.

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

(b) The actual diameter of the alveolus along the line **X–Y** is 220 micrometres ( $\mu\text{m}$ ). Calculate the magnification of Fig. 6.1.

**Show your working and give your answer to the nearest whole number.**

answer  $\times$  ..... [2]

(c) Outline two features of a gas exchange surface **that are shown on Fig. 6.1**.

1. ....  
 .....  
 2. ....  
 ..... [2]

- (d) Fig. 6.2 is a simplified diagram of the circulatory system of a human, showing gas exchange in the lungs and in respiring tissue. The partial pressures of oxygen ( $pO_2$ ) and carbon dioxide ( $pCO_2$ ) at four locations are also shown.

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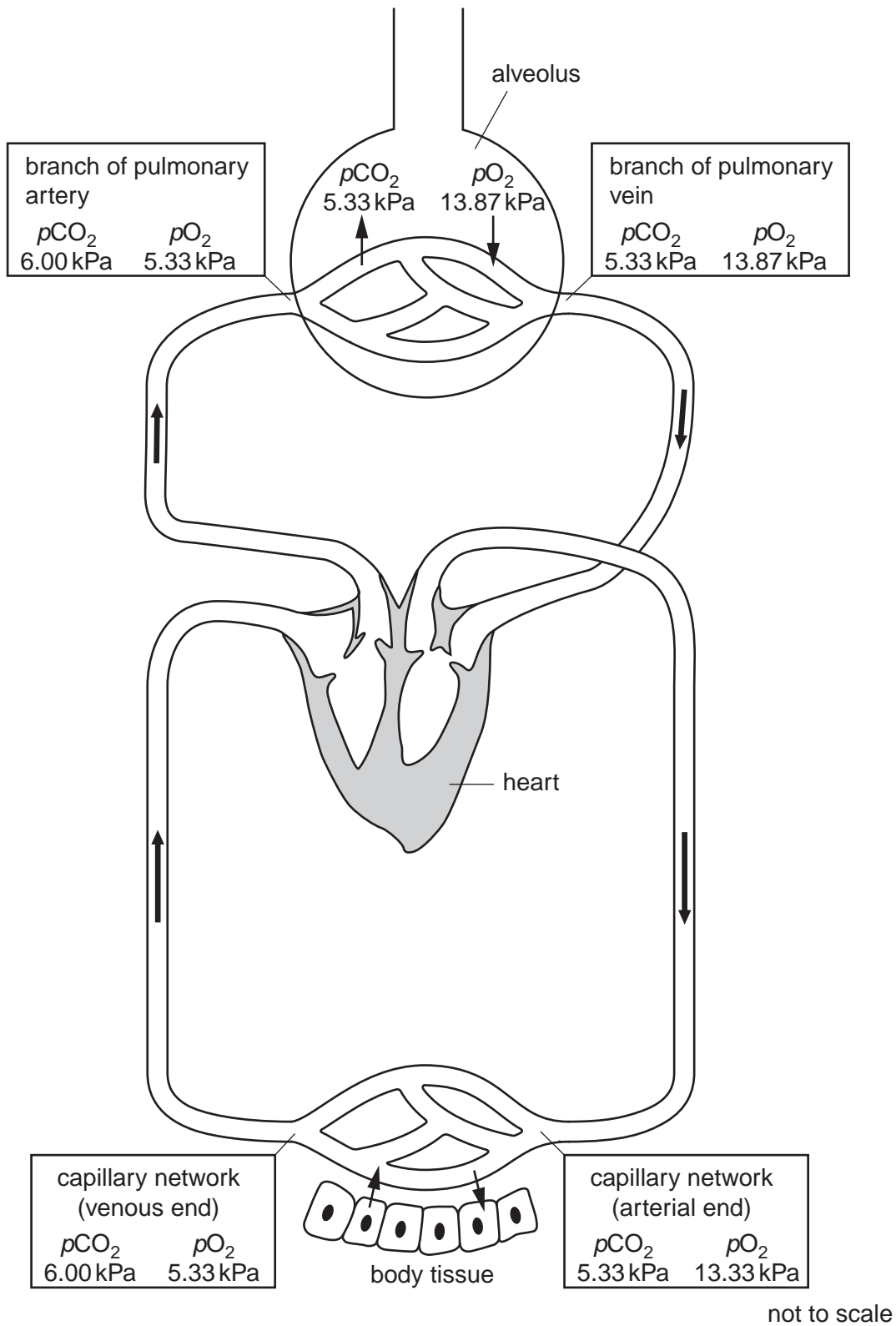


Fig. 6.2



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Question 3 Figure 3.1

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