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

CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER

BIOLOGY **9700/02**

Paper 2 Structured Questions AS **May/June 2007**

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 on all the work you hand in.
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 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	
Total	

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

Answer **all** the questions.

1 Fig. 1.1 is a drawing made from an electron micrograph of a cell from the ciliated epithelium of the bronchus.

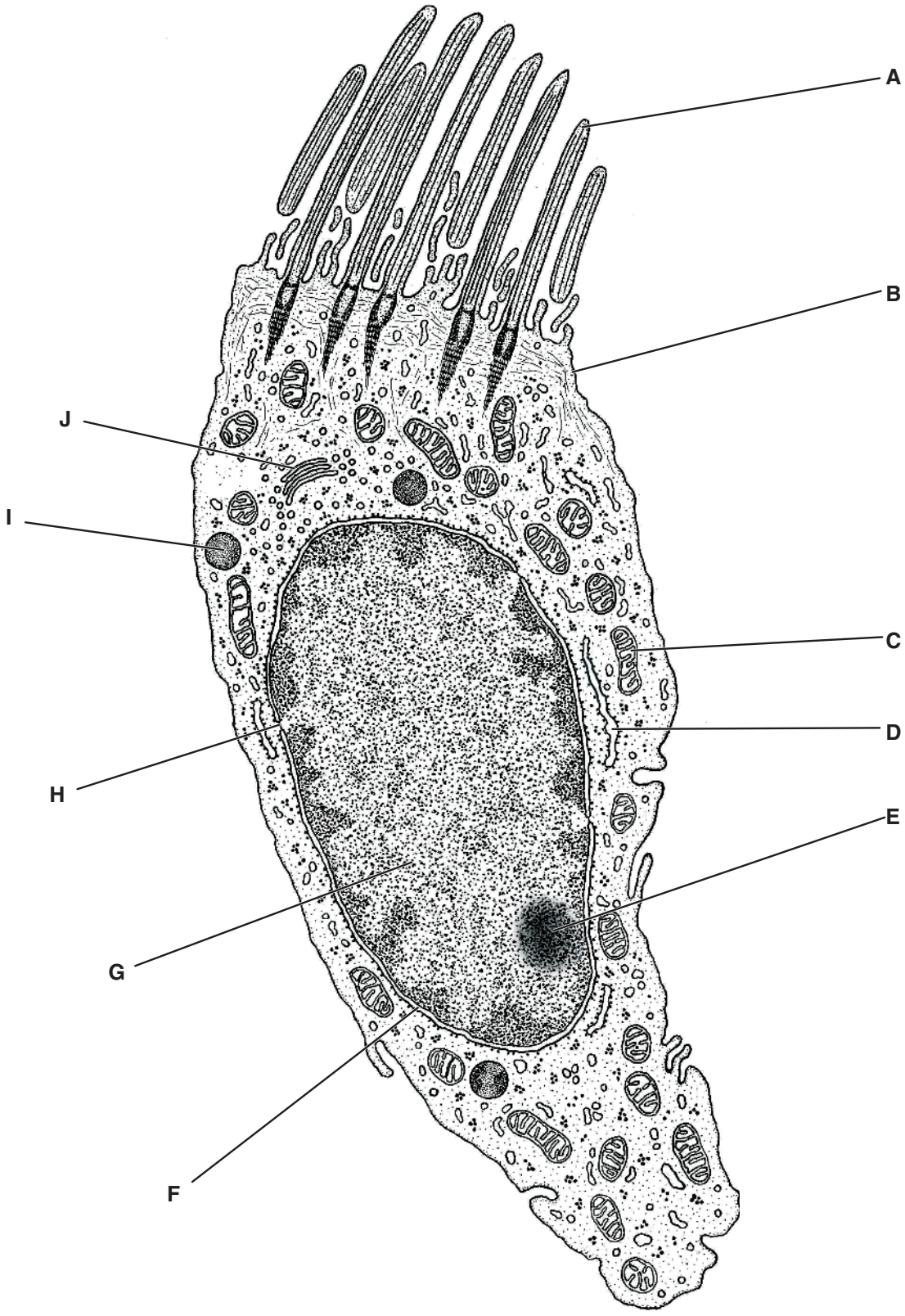

Fig. 1.1

(a) Complete the table below by writing the appropriate letter from Fig. 1.1 to indicate the structure that carries out each of the functions listed. The first one has been completed for you.

function	structure
facilitated diffusion of glucose	**B**
creates a current to move mucus	
aerobic respiration	
makes ribosomes	
a site of transcription	
packages proteins into lysosomes	

[5]

(b) The alveoli in the lungs are lined by a squamous epithelium.

Explain why gas exchange occurs in alveoli and not in the bronchus.

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.....[3]

(c) Describe the likely appearance of the lining of the bronchus in a person who has been a heavy smoker for many years.

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.....[3]

[Total: 11]

2 **(a)** Describe how enzymes take part in chemical reactions.

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.....[4]

Starch phosphorylase is an enzyme found in plant cells. In potato tuber cells, the enzyme takes part in the breakdown of starch when the tuber begins to grow.

$$\text{starch} + \text{phosphate ions} \xrightarrow{\text{starch phosphorylase}} \text{glucose 1-phosphate}$$

A student investigated the effect of pH on this reaction using two buffer solutions.

The student prepared four test-tubes, **A** to **D**, as shown in Table 2.1 and described below.

The student made an extract of potato tissue that contained the enzyme. Some of this extract was boiled.

A solution of potassium dihydrogen phosphate was added to some tubes as a source of phosphate ions.

The test-tubes were left for ten minutes in a water bath at 30 °C and then samples were tested with iodine solution.

Table 2.1

test-tube	contents					results with iodine solution after ten minutes
	volume of starch solution / cm^3	volume of glucose 1-phosphate solution / cm^3	volume of potassium dihydrogen phosphate solution / cm^3	pH of buffer solution	enzyme extract	
A	2		0.5	6.5	unboiled	negative
B	2		0.5	2.0	unboiled	positive
C	2		0.5	6.5	boiled	positive
D		2		6.5	boiled	negative

(b) (i) State what the student would conclude from a positive result with iodine solution.

.....[1]

(ii) Explain why the student boiled some of the extract in this investigation.

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(c) Explain the results shown in Table 2.1.

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.....[4]

[Total: 11]

3 Muntjac are small deer found throughout Asia. Cells at the base of the epidermis in the skin continually divide by mitosis. Fig. 3.1 shows the chromosomes from a skin cell of a female Indian muntjac deer at metaphase of mitosis.

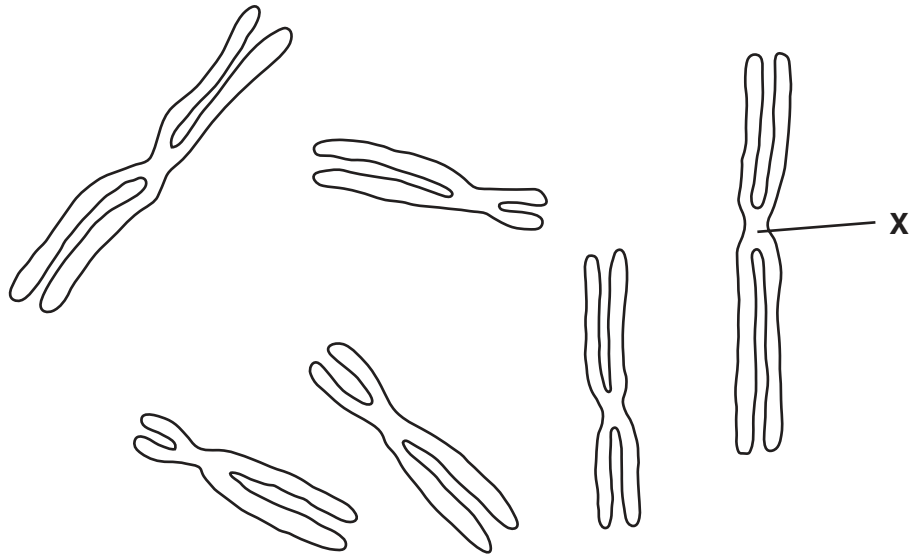

Fig. 3.1

(a) (i) State the diploid chromosome number of the female Indian muntjac deer.

.....[1]

(ii) Name **X** and state its role in mitosis.

name .....

role .....

.....[2]

(iii) On Fig. 3.1, **shade in** a pair of homologous chromosomes. [1]

(iv) In the space below, draw one of the chromosomes shown in Fig. 3.1 as it would appear during **anaphase** of mitosis.

[2]

(b) Outline what happens to **a chromosome** between the end of anaphase and the start of the next mitosis.

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.....[3]

(c) During the formation of eggs in the ovary of the female Indian muntjac deer, the chromosome number changes.

State what happens to the chromosome number and explain why this change is necessary.

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.....[2]

[Total: 11]

4 Fig. 4.1 shows the movement of sucrose from source to sink through the phloem in a plant.

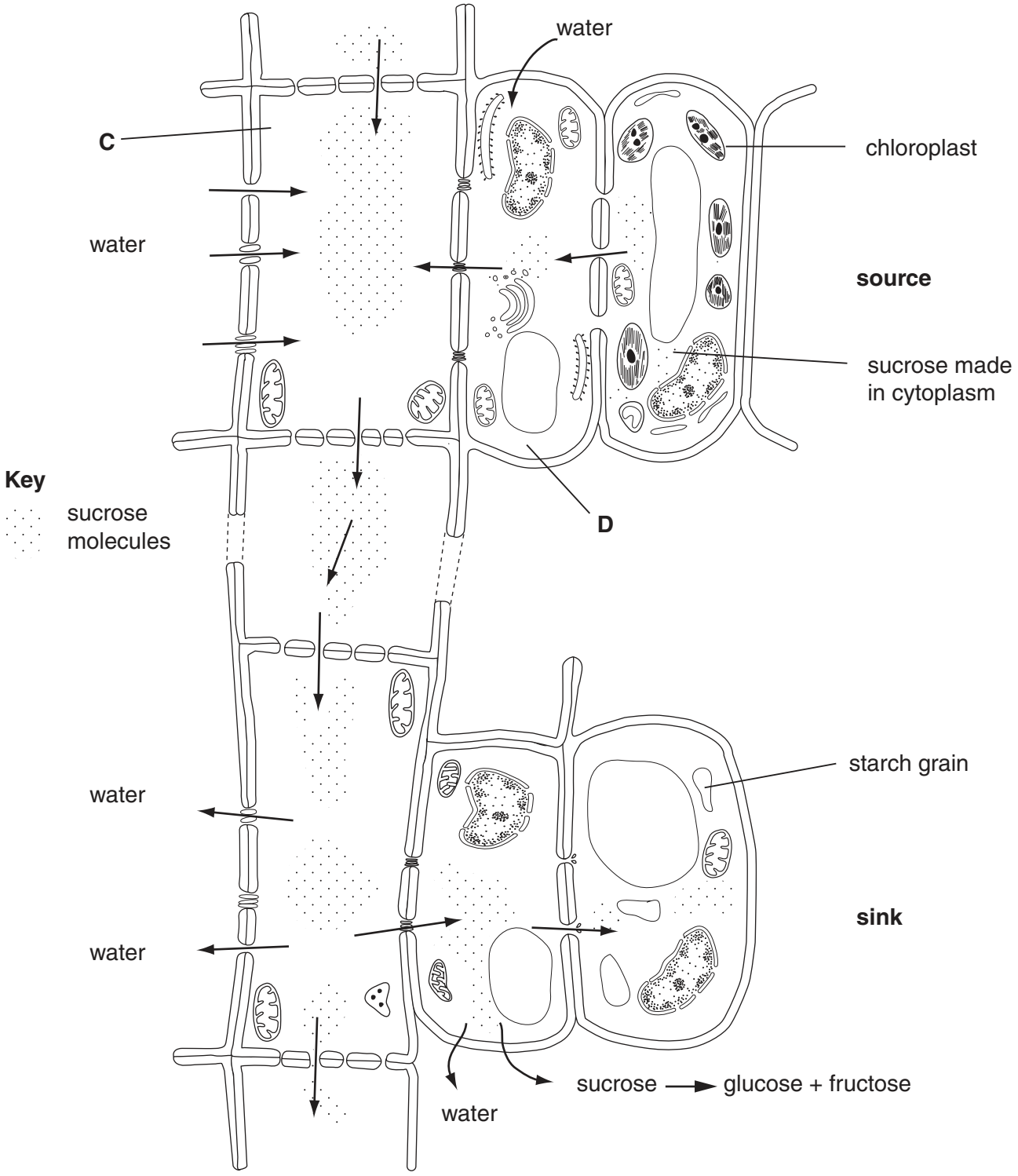

Fig. 4.1

(a) With reference to Fig. 4.1,

(i) name an example of a source and a sink

source .....

sink .....[1]

(ii) name cells **C** and **D**.

C .....

D .....[1]

(b) With reference to Fig. 4.1, explain how sucrose travels from,

the source to cell **C** .....

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cell **C** to the sink. .....

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.....[4]

(c) Explain why multicellular plants require transport systems for substances, such as water and sucrose.

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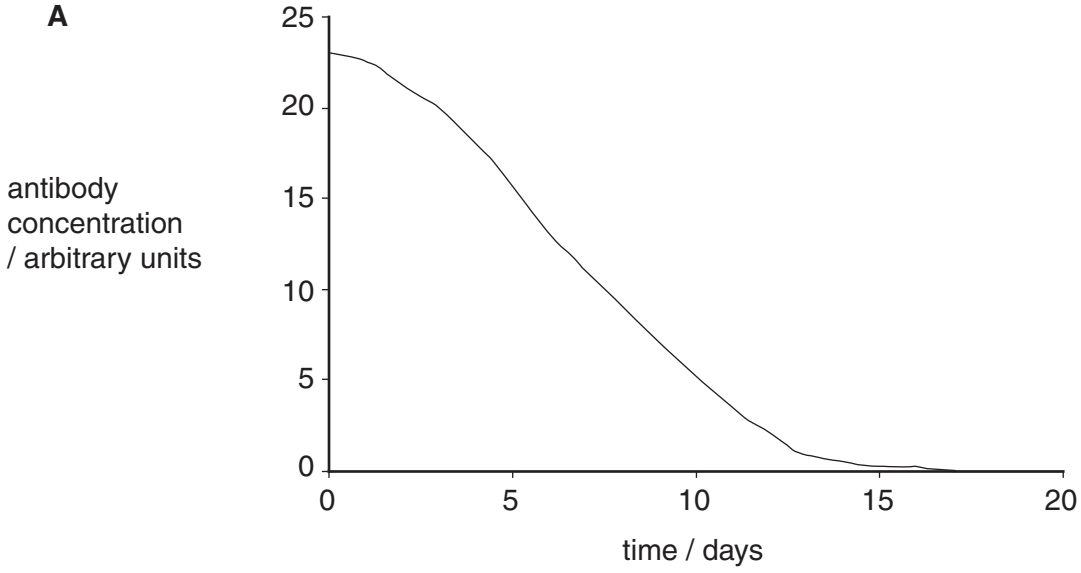
.....[2]

[Total: 8]

5 Two people took part in a study to find out the effectiveness of two types of immunisation. Person **A** received an injection of antibodies against tetanus and person **B** received a tetanus vaccination.

Over the new few weeks, the blood from these two people was analysed for the presence of antibodies to tetanus. The results are shown in Fig. 5.1**A** and Fig. 5.1**B**.

A



B

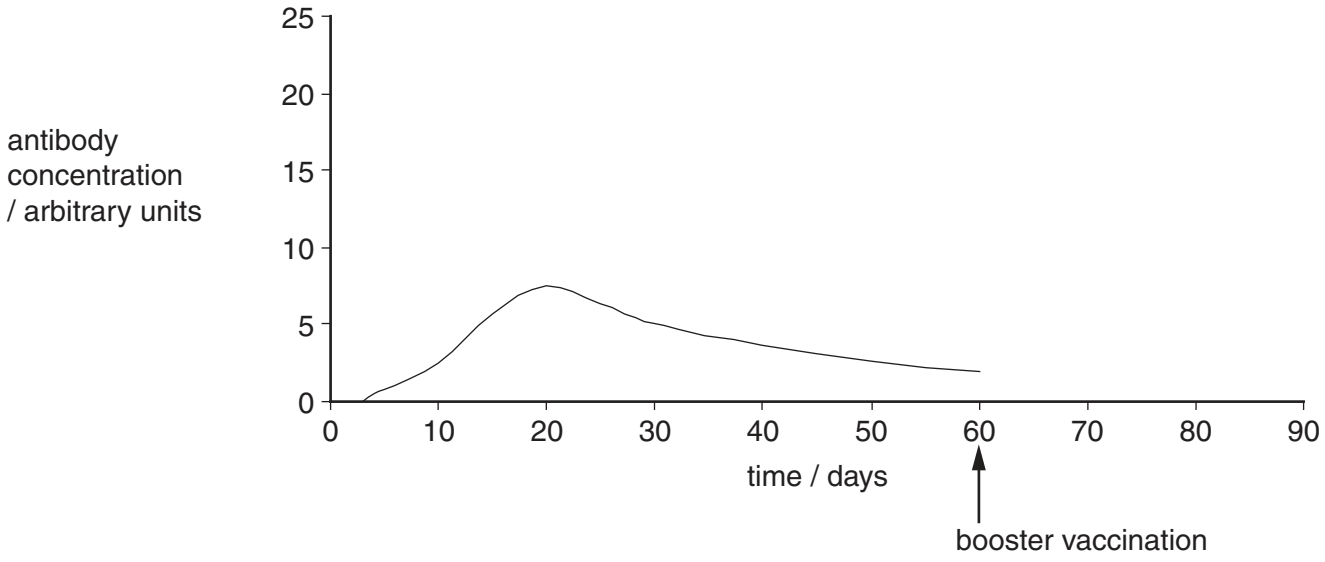


Fig. 5.1

(a) Name the types of immunity shown by Fig. 5.1 **A** and **B**.

A .....

B .....[2]

(b) Explain why the antibody concentration in person **A**,

(i) decreased during the study period

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(ii) did not increase.

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.....[3]

(c) **Sketch on** Fig. 5.1 **B**, on page **10**, what you would expect to happen to the antibody concentration if person **B** received a booster vaccination at **day 60**.

Put your answer to this question on Fig. 5.1 **B** on page **10**.

[2]

(d) Explain why, in this investigation, the experimenters had to measure the concentration of antibodies to tetanus rather than the concentration of all antibodies in the blood of **A** and **B**.

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[Total: 9]

6 Fig. 6.1 shows a diagram of a plasma (cell surface) membrane.

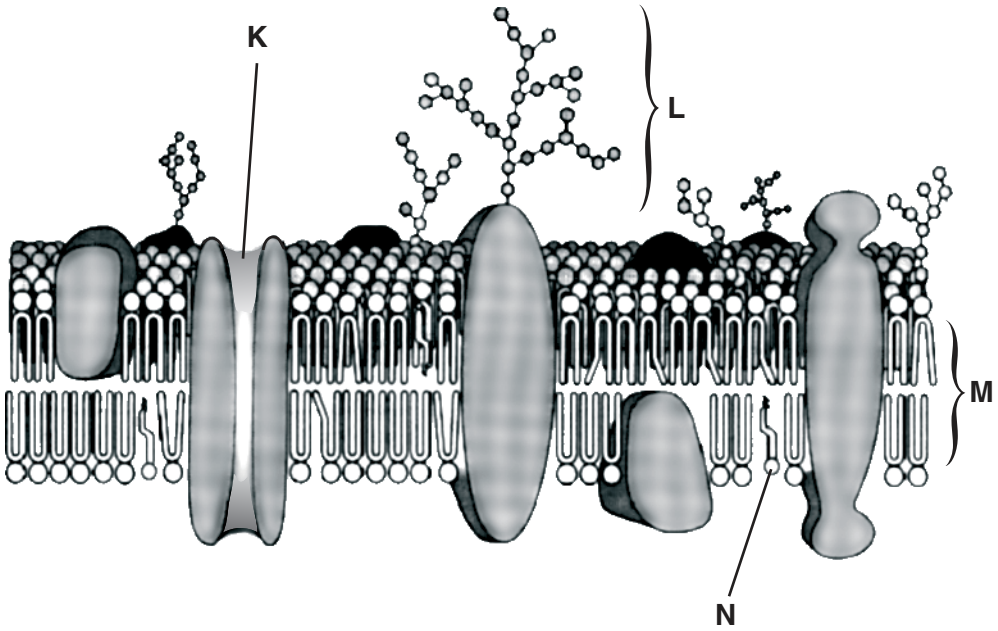

Fig. 6.1

(a) Indicate, by putting a circle, ( ), around **one** of the following, the width of the membrane shown in Fig. 6.1.

0.7 nm 7.0 nm 70 nm 7×10^{-5} m 700 µm 7.0 µm [1]

(b) Outline the functions of the following components of the plasma membrane.

K .....

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L .....

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M .....

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N .....

.....[4]

(c) Some substances may cross plasma membranes by simple diffusion. Glucose, however, does not.

Explain why glucose cannot pass across membranes by simple diffusion.

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.....[2]

(d) In an investigation, animal cells were exposed to different concentrations of glucose. The rate of uptake of glucose into the cells across the plasma membrane was determined for each concentration. Fig. 6.2 shows the results.

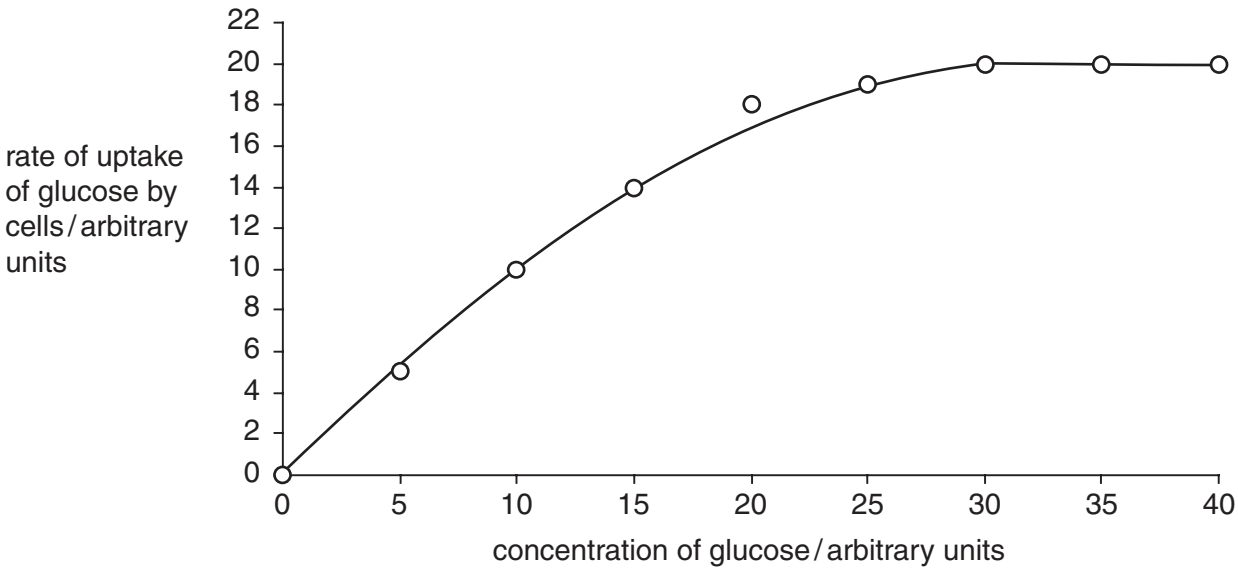

Fig. 6.2

Using the information in Fig. 6.2, explain how the results of the investigation support the idea that glucose enters cells by facilitated diffusion.

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.....[2]

QUESTION 6 CONTINUES ON PAGE 14

[Turn over

(e) State how active transport differs from facilitated diffusion.

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.....[1]

[Total: 10]

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