

Candidate Name	Centre Number	Candidate Number
		2



## GCE AS/A level

1071/01

**New AS**

### BIOLOGY/HUMAN BIOLOGY – BY1

A.M. THURSDAY, 8 January 2009

1½ hours

For Examiner's use only		
Question	Maximum Mark	Mark Awarded
1	6	
2	5	
3	6	
4	9	
5	15	
6	10	
7	9	
8	10	
<b>Total</b>	<b>70</b>	

#### INSTRUCTIONS TO CANDIDATES

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

Answer **all** questions.

Write your answers in the spaces provided in this booklet.

#### INFORMATION FOR CANDIDATES

The number of marks is given in brackets at the end of each question or part-question.

You are reminded of the necessity for good English and orderly presentation in your answers.

The quality of written communication will affect the awarding of marks.

1. Below is a list of chemicals which may be found in cells.

- |   |            |   |           |
|---|------------|---|-----------|
| A | magnesium  | F | calcium   |
| B | maltose    | G | phosphate |
| C | amino acid | H | water     |
| D | cellulose  | I | sucrose   |
| E | iron       |   |           |

Each of the following statements applies to one or more of these chemicals. After each statement, write in the box the letter or letters which correspond(s) to the chemical(s) being described. Each letter may be used once, more than once, or not at all.

- |     |  |                          |
|-----|--|--------------------------|
| (a) | Found in bones and teeth.                                      | <input type="checkbox"/> |
| (b) | A non-reducing sugar   | <input type="checkbox"/> |
| (c) | Found in chlorophyll in leaves.                                | <input type="checkbox"/> |
| (d) | A polysaccharide found in plant cell walls.                    | <input type="checkbox"/> |
| (e) | Found attached to lipids in the plasma membrane.               | <input type="checkbox"/> |
| (f) | A large quantity of energy is needed to raise its temperature. | <input type="checkbox"/> |

(Total 6 marks)

2. (a) The level of protein structure is decided by the folding of the molecule and the types of bonds present.

Tick (✓) the boxes in the table to show all the bonds present at each level of protein structure. [3]

Level of protein structure	Types of bonds			
	peptide	hydrogen	disulphide	ionic
Primary				
Secondary				
Tertiary				

(b) (i) How does the quaternary structure of a protein differ from the tertiary structure? [1]

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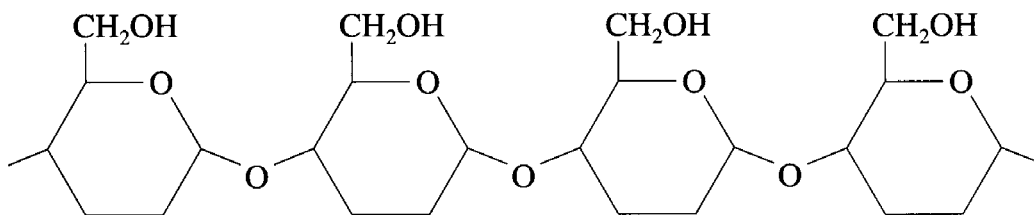
(ii) Give an example of a quaternary protein. [1]

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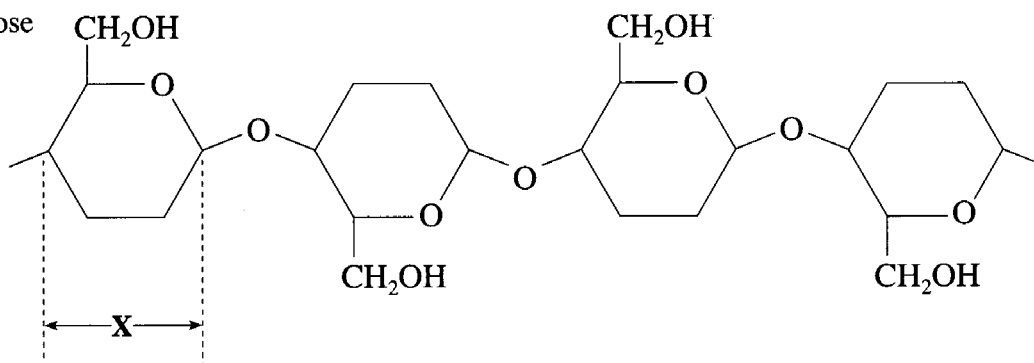
(Total 5 marks)

3. The diagrams show part of a molecule of starch (A) and part of a molecule of cellulose (B). The hexagonal shapes represent hexose sugars.

A. starch



B. cellulose



- (a) Name monosaccharide **X** and its form. [1]

.....

- (b) Name the bond formed between two hexose sugars. [1]

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- (c) State **two** structural differences between starch and cellulose. [2]

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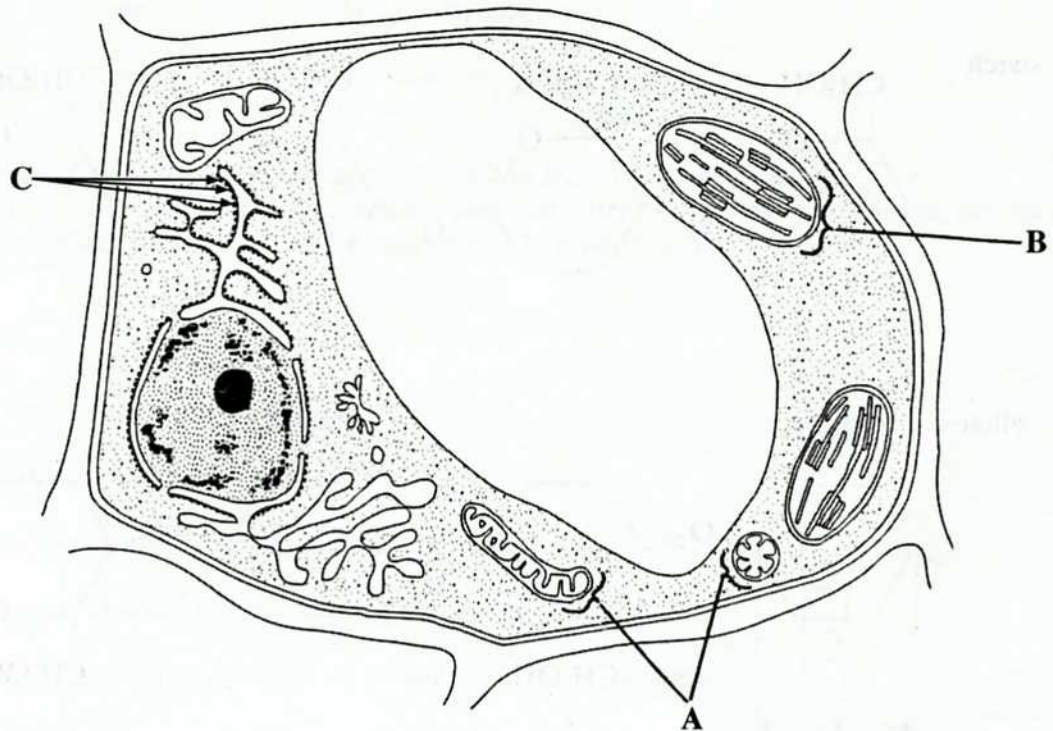
- (d) Starch is a compact storage polysaccharide. Cellulose has a structural role in plant cell walls. Describe how cellulose units are arranged in a complete molecule and how this arrangement gives cellulose a high tensile strength. [2]

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(Total 6 marks)

Turn over.

4. The diagram shows the ultra-structure of a plant cell.



(a) Complete the table by naming and stating the function of each of the organelles labelled A, B and C. [6]

Organelle	Name	Function
A		
B		
C		

(b) The structures labelled A are identical. Explain why they differ in appearance in the diagram. [1]

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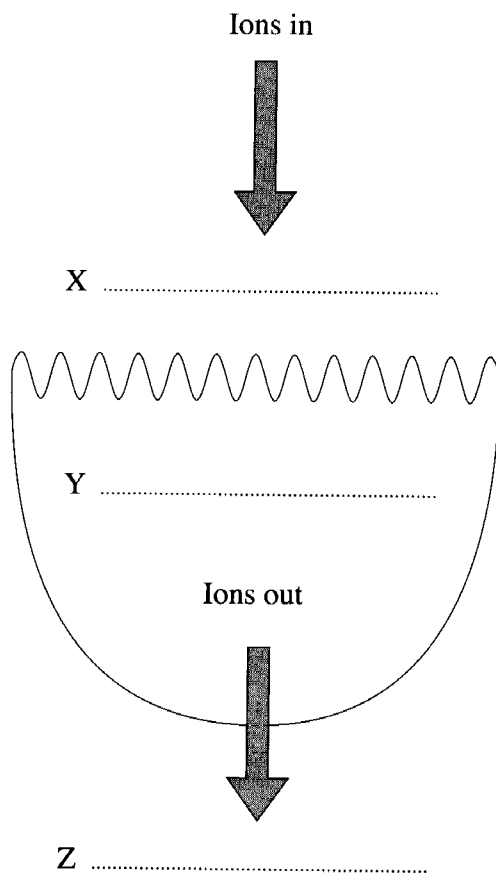
(c) State **two** ways in which an animal cell would differ from a plant cell. [2]

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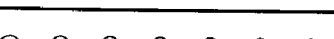
**(Total 9 marks)**

5. (a) The diagram shows an animal cell.



- (i) Sodium ions diffuse into the cell. They then move out of the cell by active transport. Complete the diagram using the words **HIGH** or **LOW** to show the relative concentration of sodium ions at X, Y and Z. [1]
- (ii) Explain how **one** structural feature of the cell shown helps to ensure a rapid rate of diffusion. [1]

(b) (i) A number of factors influence the rate of diffusion. In the table below circle the **letter** which shows the combination of factors which give the most rapid rate of diffusion. [1]

<i>Appearance of membrane</i>	<i>Concentration gradient</i>	<i>Thickness of membrane</i>	
	high to low	thick	A
	low to high	thin	B
	high to low	thin	C
	high to low	thick	D
	low to high	thin	E

(ii) Using the information in the diagram in part (a), explain how active transport of sodium ions out of the cell helps to ensure a rapid rate of diffusion of sodium ions into the cell. [1]

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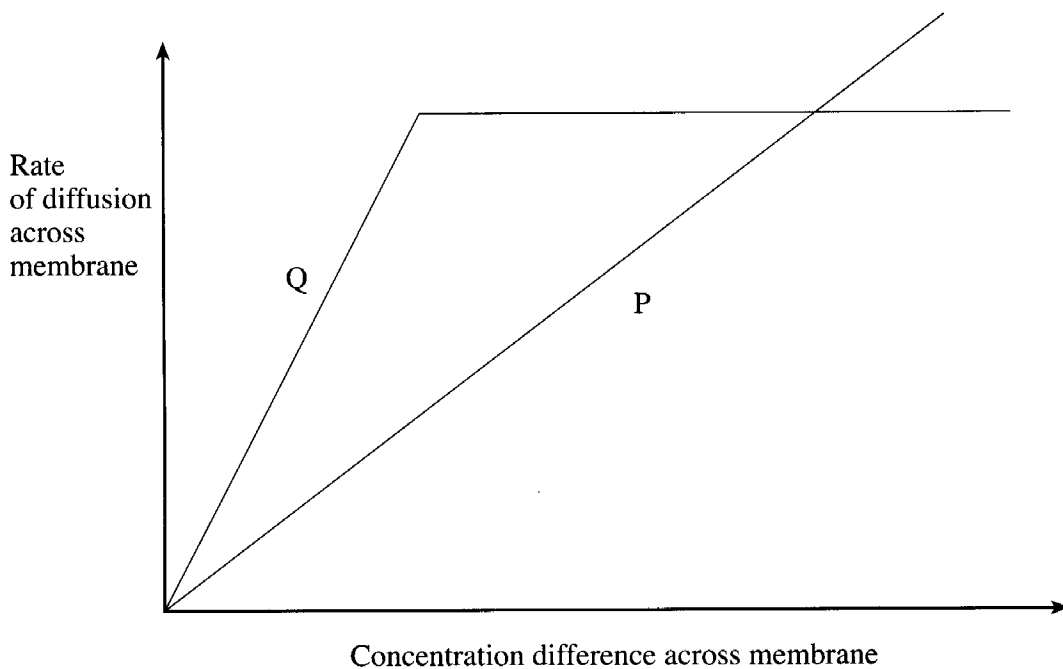
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(iii) Describe and explain the effect of an increase in temperature on the rate of diffusion. [2]

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.....

(c) The graph shows the relationship between concentration difference across a membrane and the rate of diffusion, for diffusion and facilitated diffusion.



(i) Identify the two lines.

P .....

Q .....

[1]

(ii) Using the graph and your knowledge of membrane structure explain the difference between P and Q. [2]

[2]

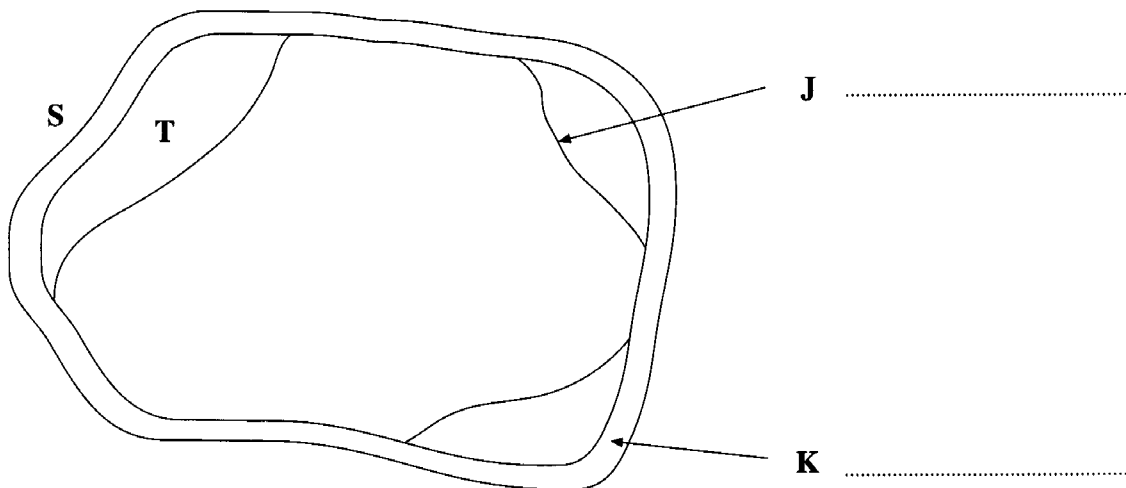
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**Turn over.**

- (d) Define the term *water potential*. [1]

- (e) A turgid plant cell was placed in a concentrated solution of sucrose. The diagram shows the appearance of the cell after one hour.

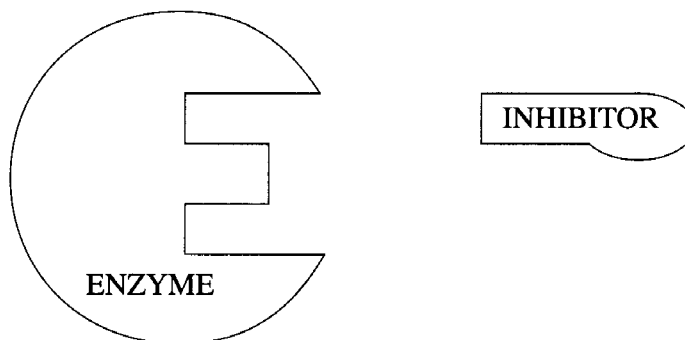


- (i) Label structures **J** and **K** on the diagram. [2]
- (ii) What evidence on the diagram shows that the water potential of the cell sap must be higher (less negative) than that of the sucrose solution? [1]
- (iii) Use your knowledge of a property of structure **K** to explain why the water potential at **T** must be equal to that at **S**. [2]

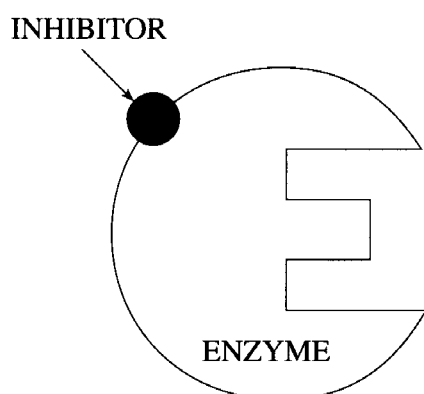
(Total 15 marks)

6. (a) Diagrams **A** and **B** represent two different types of enzyme inhibition.

**A.**



**B.**



(i) State the type of inhibition shown in **A** and **B**. [2]

**A** .....

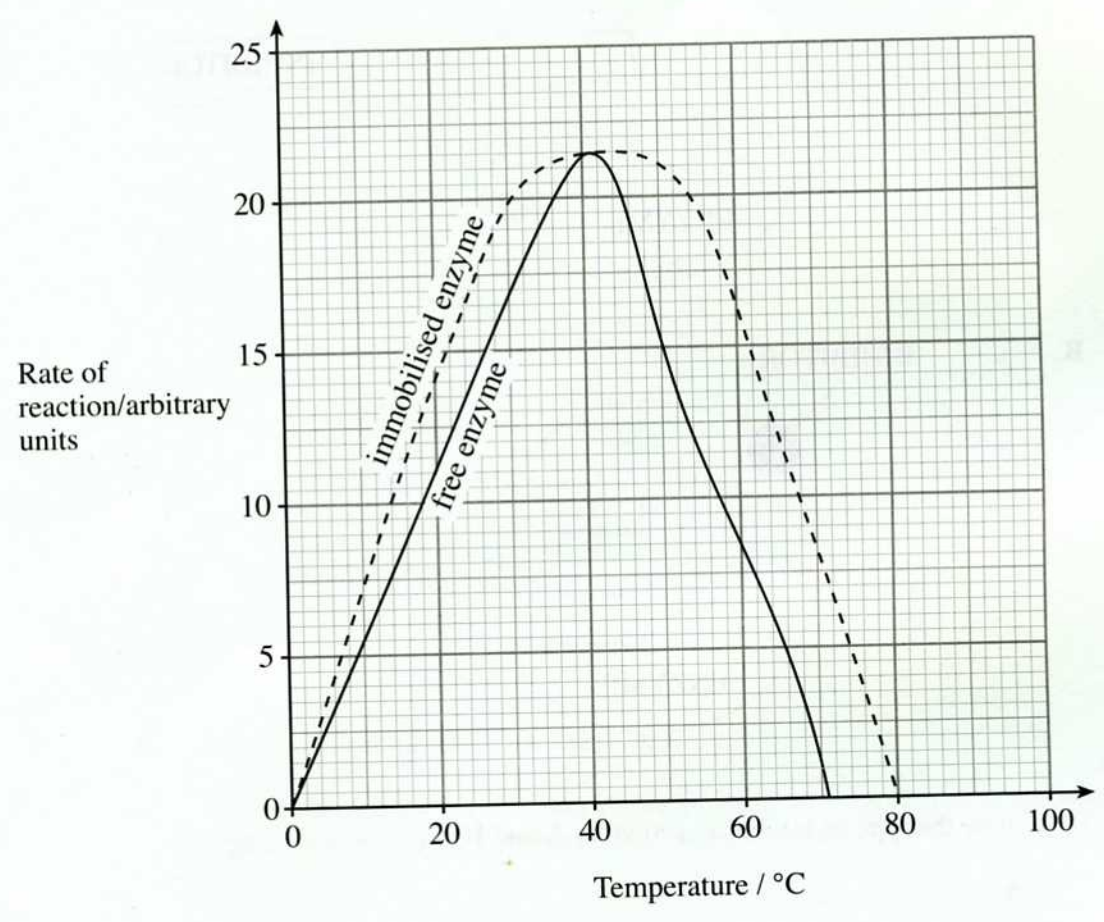
**B** .....

(ii) What type of inhibition, **A** or **B**, would be **decreased** by increasing the concentration of substrate? [1]

.....



(b) Immobilised enzymes are enzyme molecules that are trapped on an inert matrix such as a gel capsule. The graph shows the effect of temperature on the maximum rate of reaction of the **same** enzyme in its free and in its immobilised state.



(i) Explain the rate of reaction at 5°C and 70°C for the **free** enzyme. [2]

5°C .....

.....

70°C .....

.....

(ii) Describe **three** differences between the effects of temperature on the immobilised and the 'free' enzyme. [3]

1. ....

.....

2. ....

.....

3. ....

.....

(iii) Suggest how trapping the enzyme to an inert matrix can explain the differences you have described in part (b) (ii). [1]

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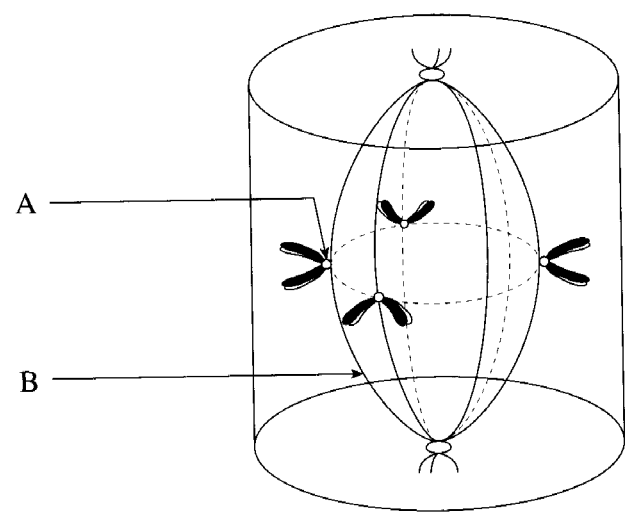
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(iv) Describe **one** use of immobilised enzymes in medicine. [1]

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**(Total 10 marks)**

7. The diagram shows a three-dimensional view of one of the stages of mitosis in a typical animal cell.



(a) (i) Name the stage shown. [1]

.....

(ii) Name the structure labelled A. [1]

.....

(iii) State the function of structure B. [1]

.....

(b) Dividing cells undergo a regular pattern of events, known as the cell cycle. The following statements describe some of the main events taking place in animal cells. Insert the name of the appropriate stage in the box opposite each statement. [3]

Statement	Stage in cell cycle
Chromosomes shorten and thicken and spindle forms	
A period of intense activity which includes the replication of DNA	
Formation of two nuclei	

(c) Complete the table to show **three** differences between meiosis and mitosis. [3]

Meiosis	Mitosis

(Total 9 marks)

8. Answer **one** of the following questions.  
Any diagrams included in your answer must be fully annotated.

**Either,** (a) (i) Describe the structure of DNA. [7]  
(ii) What are the differences between DNA and RNA? [3]

**Or** (b) Explain how the properties of water are important to plants and animals.  
Use examples where appropriate. [10]

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