

Surname	Centre Number	Candidate Number
Other Names		2



**GCE AS/A level**

1071/01

**BIOLOGY/HUMAN BIOLOGY – BY1**

A.M. WEDNESDAY, 11 January 2012

1½ hours

For Examiner's use only		
Question	Maximum Mark	Mark Awarded
1.	6	
2.	8	
3.	8	
4.	11	
5.	4	
6.	10	
7.	13	
8.	10	
<b>Total</b>	<b>70</b>	

### INSTRUCTIONS TO CANDIDATES

Use black ink or black ball-point pen. Do not use gel pen or correction fluid.

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

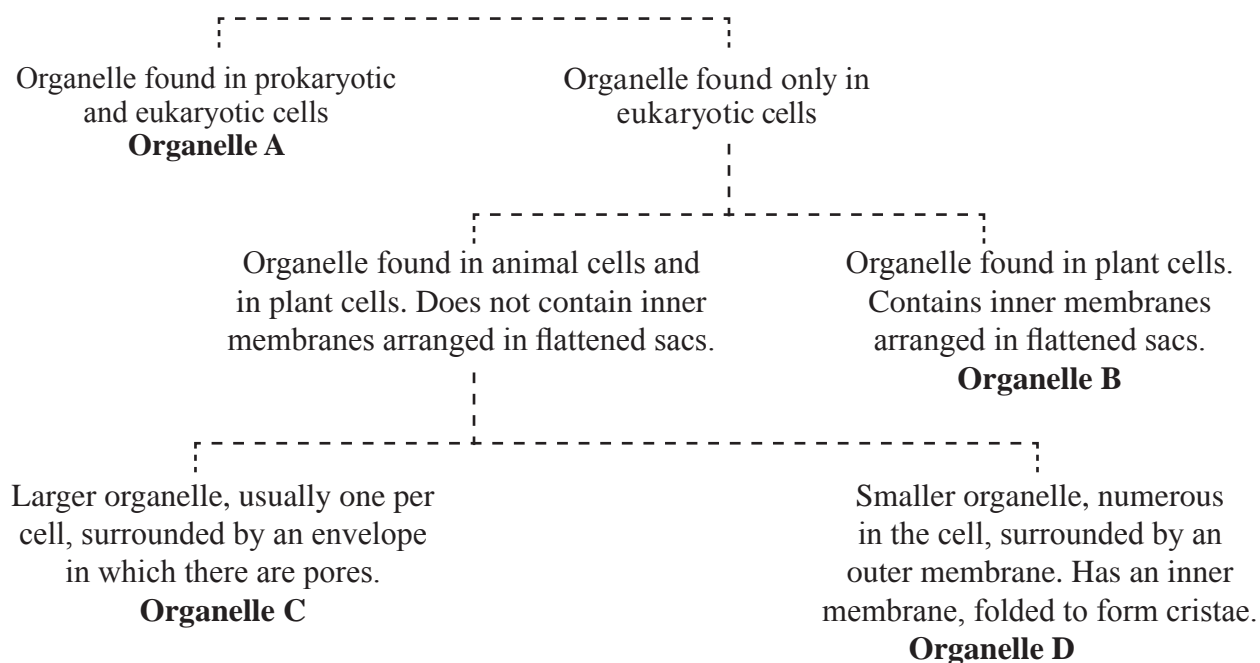
The number of marks is given in brackets at the end of each question or part-question.

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. The diagram shows how some organelles may be distinguished from each other.



- (a) (i) Name organelle **D**. [1]

.....

- (ii) Describe the function of organelle **D**. [2]

.....

.....

.....

- (iii) Name a cell that contains **large** numbers of organelle **D**. [1]

.....



(b) Which of the organelles **A**, **B**, **C** or **D** is a ribosome?

[1]

.....

(c) What is the function of the pores in organelle **C**?

[1]

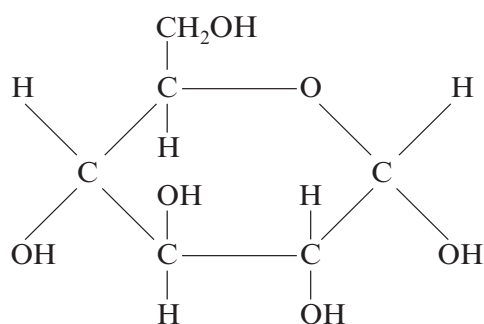
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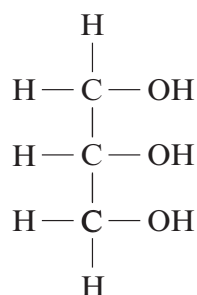
**(Total 6 marks)**



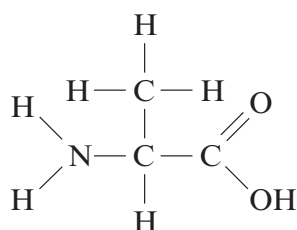
2. The following diagrams represent the structure of four biologically important compounds.



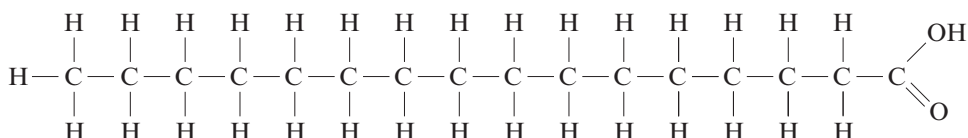
A



B



C



D

- (a) A chemical element found in a molecule of compound **C** is not found in molecules of the other three compounds. **Name** this element. [1]

.....

- (b) A reducing sugar in solution can be detected in the laboratory.

- (i) Describe the biochemical test you would use to show that the solution contained a reducing sugar. [2]

.....  
 .....  
 .....

- (ii) Which of the compounds **A** to **D** will give a positive result with this biochemical test? [1]

.....

- (c) Which of the compounds **A** to **D** has molecules that will join together by peptide bonds? [1]

.....



- (d) (i) Which of the compounds **A** to **D** is a fatty acid?

[1]

.....

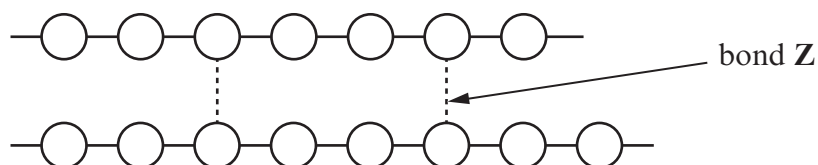
- (ii) State how the structure of a saturated fatty acid differs from the structure of an unsaturated fatty acid.

[2]

.....  
 .....  
 .....  
 .....

(Total 8 marks)

3. The diagram represents part of a cellulose molecule.



- (a) (i) Name bond **Z** as shown on the diagram.

[1]

.....

- (ii) Explain the importance of bond **Z** in the role of cellulose in plant cell walls.

[2]

.....  
 .....  
 .....

- (b) (i) Name the chemical reaction by which monomers join together to form cellulose.

[1]

.....

- (ii) Chitin has many chemical and structural similarities to cellulose. In chitin what additional compound replaces one of the  $\text{-OH}$  groups in each of its monosaccharides?

[1]

.....

- (iii) State the structural role of chitin in insects and describe its properties that make it suitable for this role.

[1]

.....  
 .....



(c) Other polysaccharides have a storage function.  
Name a storage polysaccharide found in:

(i) animal cells;

[1]

.....

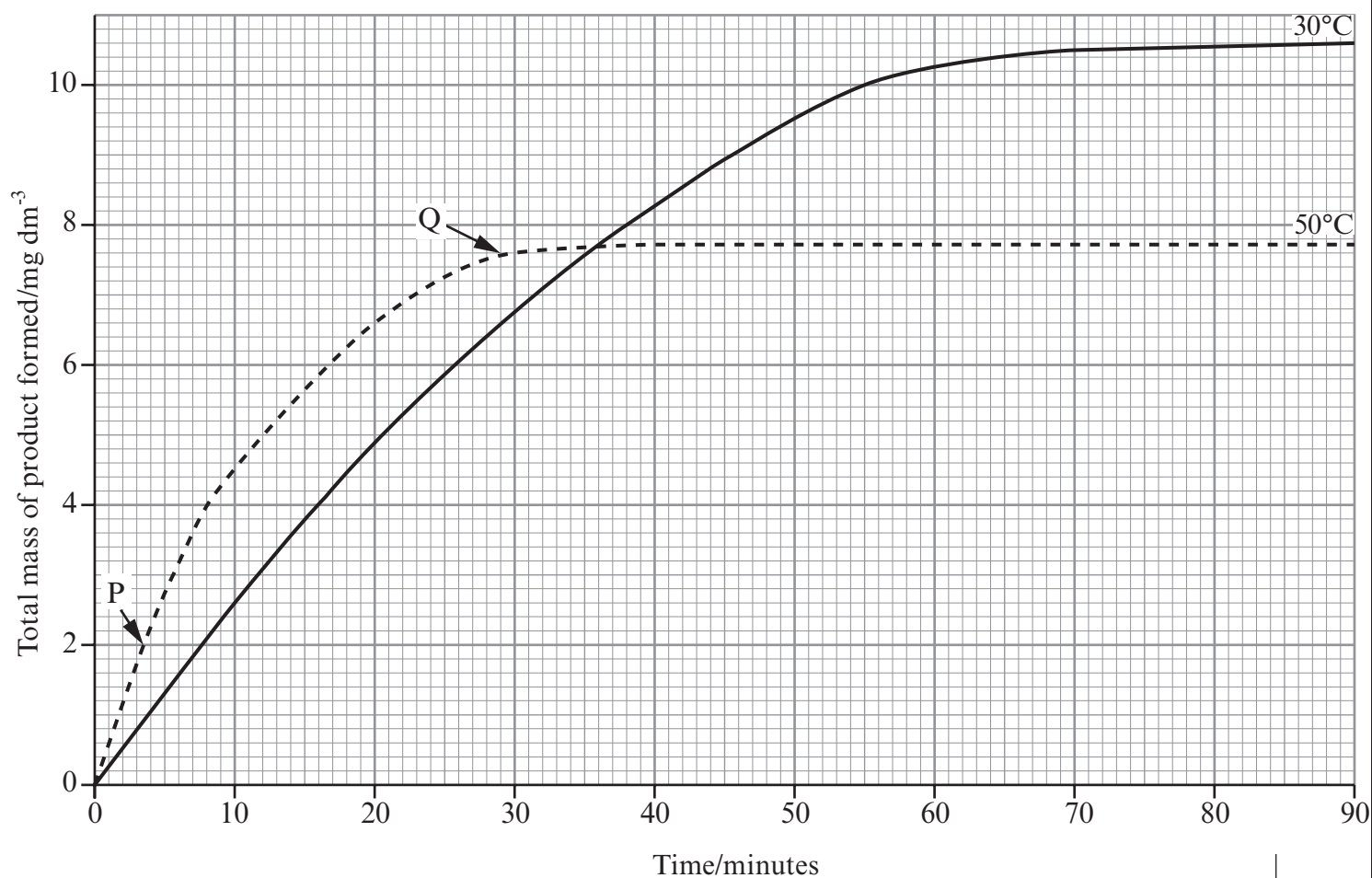
(ii) plant cells.

[1]

.....

(Total 8 marks)

4. An investigation was carried out to determine the mass of product formed in an enzyme-controlled reaction at two different temperatures, with an excess concentration of substrate. The results are shown in the graph.



- (a) (i) Calculate the rate of reaction in the first 10 minutes at 30°C. [1]

Rate = .....  $\text{mg dm}^{-3} \text{ min}^{-1}$

- (ii) State the factor which determines the rate of reaction between points **P** and **Q** on the graph. [1]

- (b) (i) Explain why the initial rate of reaction was slower at 30°C than at 50°C. [2]

- (ii) Explain the shape of the curve between 30 minutes and 60 minutes at 50°C. [3]

- (c) The investigation was repeated at 30°C with the addition of a competitive inhibitor.

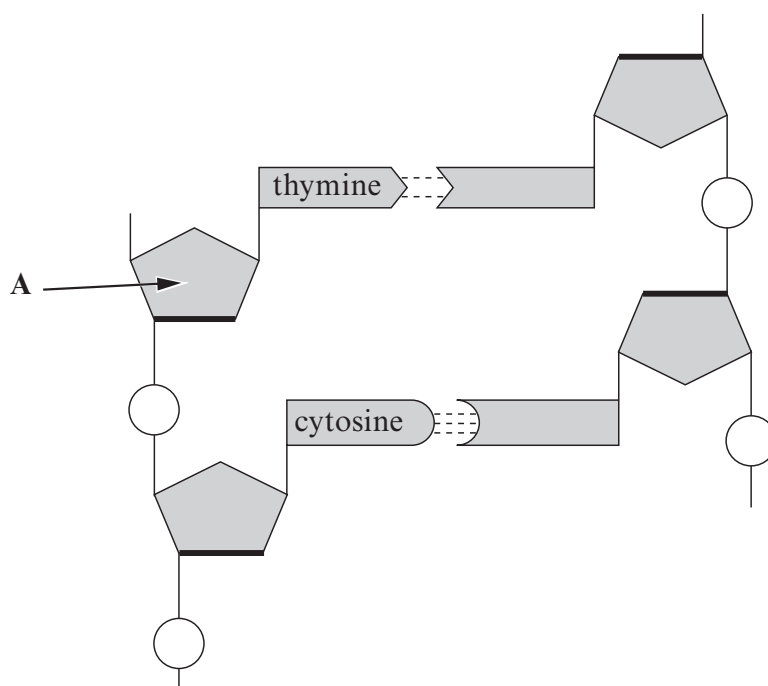
- (i) Draw the expected curve on the graph. [1]

- (ii) Explain how a competitive inhibitor would bring about this effect. [3]

(Total 11 marks)



5. The diagram represents the molecular structure of part of a DNA molecule.



- (a) Name part A. [1]

.....

- (b) Part of a DNA molecule has the following sequence of bases.

T-A-T-C-G

- (i) In the table below write the letters for the sequence of bases of the complementary portion of DNA. [1]

DNA molecule	T	A	T	C	G
complementary DNA					

- (ii) Biochemical analysis of a sample of DNA showed that 30% of the bases were guanine.  
Calculate the percentage of the bases in the sample which would be adenine.  
Show your working. [2]

Answer .....

(Total 4 marks)





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0 9

6. The photographs show chromosomes during the stages of mitosis.

Examiner  
only



H



I



J



K



L

- (a) (i) Place the stages into the correct sequence. The first box has been completed. [1]

J

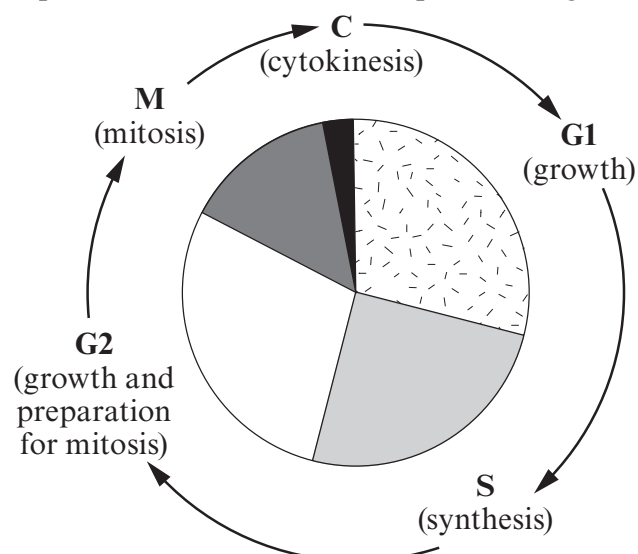
- (ii) Name stages:

[2]

I .....

L .....

- (b) The diagram represents the events that take place during the cell cycle.



The table below shows the DNA content of a cell measured during one cell cycle.

<i>Stage</i>	<i>DNA content of cell/arbitrary units</i>
G1	20
S	20 increasing to 40
G2	40
M	40
C	40 decreasing to 20

- (i) State the name of the period in the cell cycle that includes stages G1, S and G2. [1]

.....

.....

- (ii) State **two** events that occur during this period. [2]

.....

.....

- (c) Using information provided in the diagram and the table, explain why it is important that the DNA content of the cell increases during stage S and decreases during stage C. [2]

.....

.....

.....

- (d) Explain how mitosis maintains genetic stability. [2]

.....

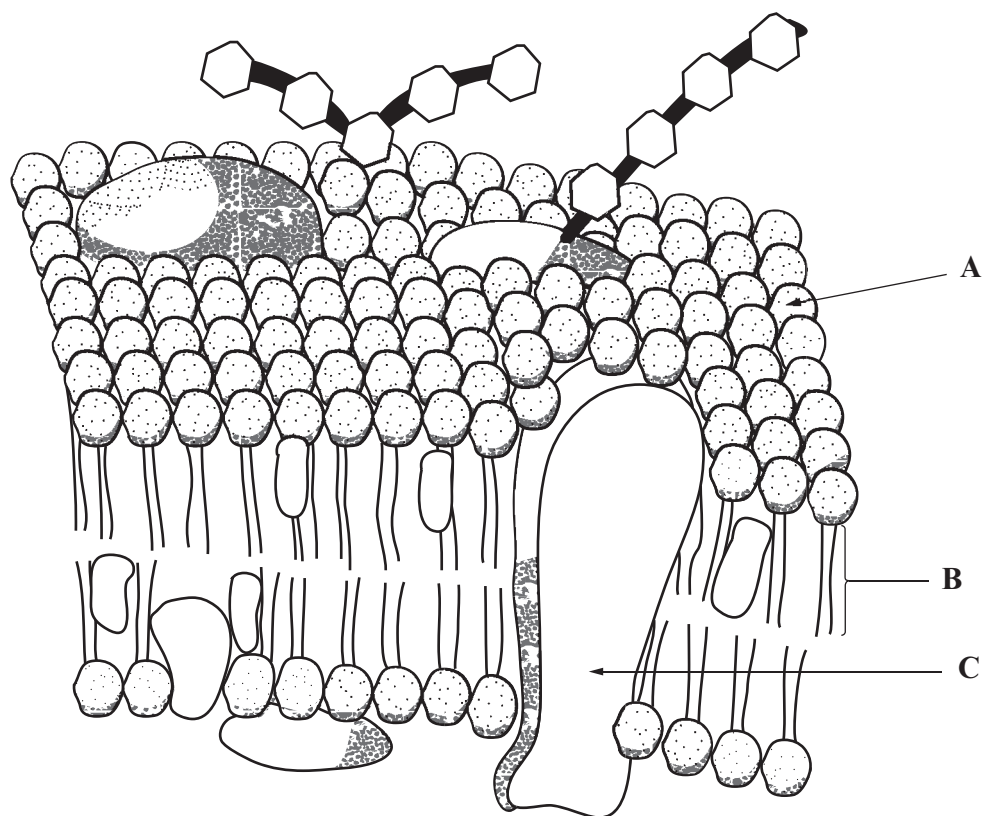
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**(Total 10 marks)**



7. The diagram shows the plasma membrane of an animal cell.



- (a) State the names of the structures labelled **A**, **B** and **C**.

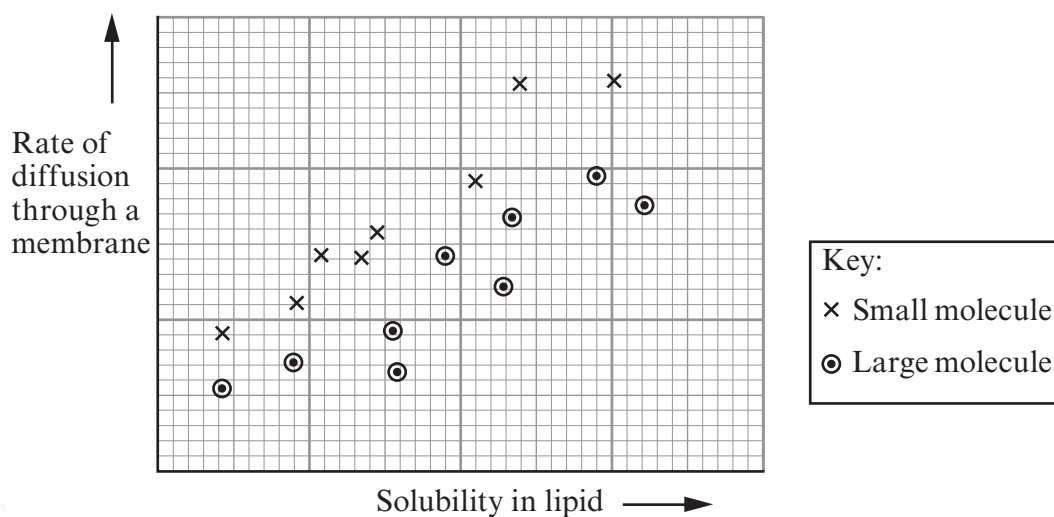
[3]

**A** .....

**B** .....

**C** .....

- (b) The graph shows the effect of molecule size and solubility in lipid on the rate of diffusion of substances through a cell surface membrane.



- (i) State with an explanation how the solubility in lipid affects the rate of diffusion through a membrane. [2]

.....

.....

.....

- (ii) Describe how molecular size affects the rate of diffusion. Suggest an explanation for your answer. [2]

.....

.....

.....

- (c) Name **two** factors which affect the rate of facilitated diffusion of a substance through a membrane. [2]

1. ....

2. ....

- (d) Vitamins B<sub>1</sub> and K enter cells by crossing the plasma membrane. As vitamin B<sub>1</sub> is water soluble while vitamin K is fat soluble they take different routes across the membrane. Explain how the different routes taken by these vitamins into a cell, is determined by the structure of the plasma membrane. [4]

vitamin B<sub>1</sub> .....

.....

.....

vitamin K .....

.....

.....

**(Total 13 marks)**







