Surname	Centre Number	Candidate Number
Other Names		2

GCE AS/A level

1071/01 – **LEGACY**

S16-1071-01

BIOLOGY/HUMAN BIOLOGY – BY1

P.M. THURSDAY, 26 May 2016

1 hour 30 minutes

For Examiner's use only		
Question	**Maximum Mark**	**Mark Awarded**
1.	**12**	
2.	**11**	
3.	**8**	
4.	**10**	
5.	**9**	
6.	**10**	
7.	**10**	
Total	**70**	

1071
010001

ADDITIONAL MATERIALS

In addition to this examination paper, you may need a calculator and a ruler.

INSTRUCTIONS TO CANDIDATES

Use black ink or black ball-point pen. Do not use gel pen. Do not use 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. If you run out of space, use the continuation pages at the back of the booklet, taking care to number the question(s) correctly.

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.

MAY1610710101

Examiner only

*Answer **all** questions.*

1. Chemical elements are joined to form biological compounds in cells and tissues.

(a) Using an example from the selection below, complete the following table. You can use the same example once, more than once or not at all. [5]

phosphorus **sodium chloride** **blood** **leaf**

starch **amino acid** **phosphate**

	Example
organic molecule	
tissue	
ion	
polymer	
element	

(b) (i) Explain, with reference to its structure, why a phospholipid is both hydrophobic and hydrophilic. [2]

.....

.....

.....

(ii) Describe *one* **cellular** function of each of the following molecules. [2]

Triglyceride

.....

.....

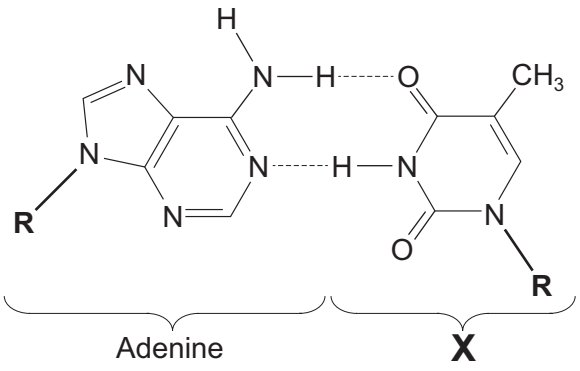
Phospholipid

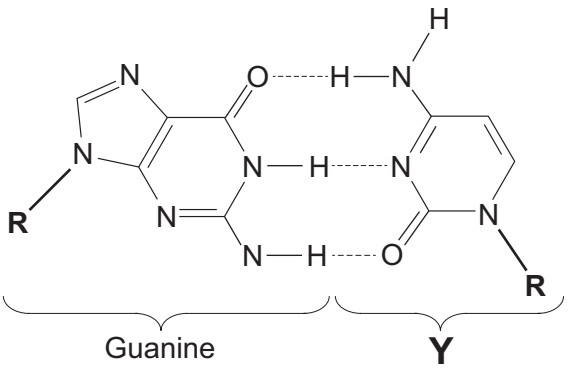
.....

.....

Examiner only

(c) The diagrams below show the base pairing in DNA.





(i) Explain why DNA is described as being a polymer. [1]

.....

.....

.....

(ii) Name the group of organic bases to which **X** and **Y** belong. [1]

.....

(iii) **R** represents a sugar-phosphate group. State the type of reaction that occurs to form a bond between the sugar-phosphate group and the organic base. [1]

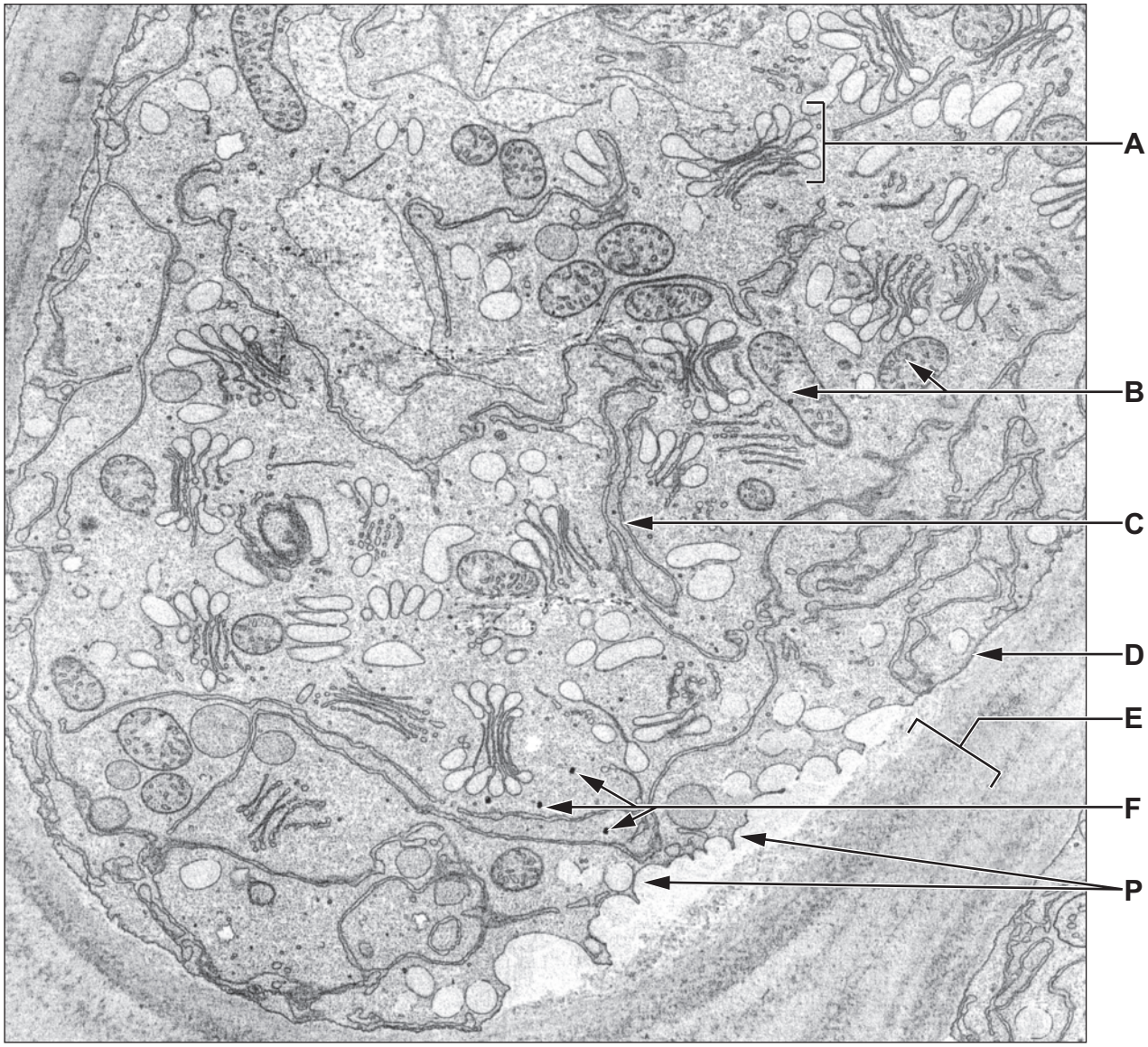
.....

12

1071 010003

Examiner only

2. The electron micrograph shows part of a plant cell.



(a) Name the structures labelled **A** to **F**. [6]

A .....

B .....

C .....

D .....

E .....

F .....

Examiner only

(b) Name a structure, not shown on the diagram, which connects the cytoplasm of adjacent plant cells. [1]

.....

(c) (i) Suggest a substance, found at point **P** on the electron micrograph, that was processed in the Golgi bodies. [1]

.....

(ii) Following processing by the Golgi body, describe how this substance was secreted from the cell. [3]

.....

.....

.....

.....

.....

.....

1071 010005

11

Examiner only

3. *(a)* Explain the formation of hydrogen bonds between water molecules.
You may use annotated diagrams in your answer. [3]

.....

.....

.....

.....

.....

.....

Examiner only

(b) The following table shows some properties of water and their significance to life. [5]

Complete the table below.

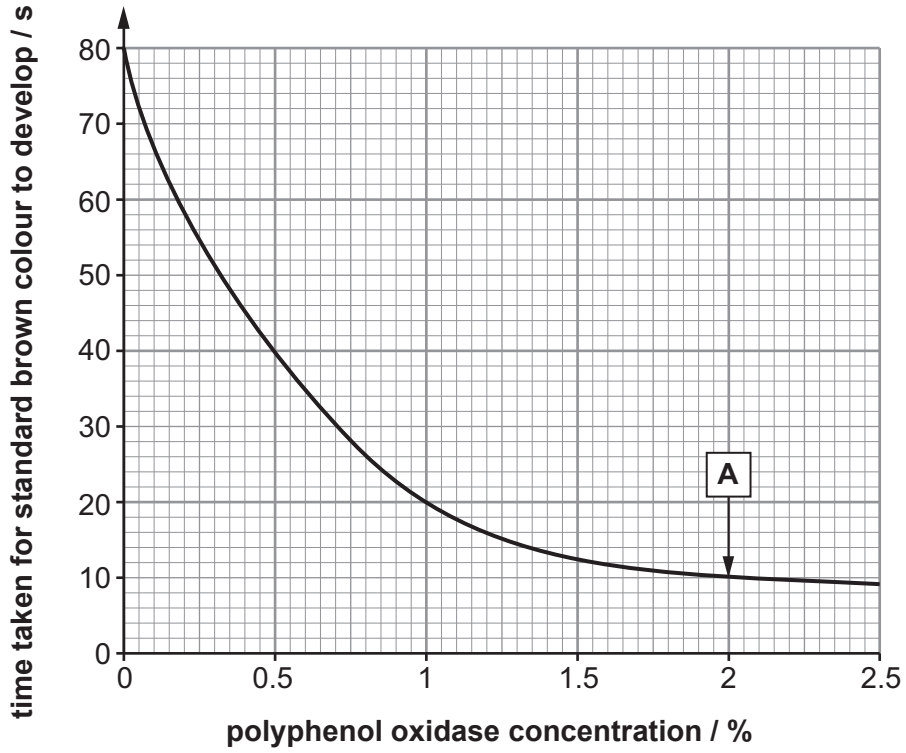
Property	Biological Significance
ice less dense than water	
	has a role in cooling the body through sweating
cohesion between water molecules	
	minimises temperature fluctuation in aquatic habitats
dissolves ionic substances	

Examiner only

4. The enzyme, polyphenol oxidase, catalyses the production of dark brown coloured pigments from naturally occurring phenolic compounds (e.g. catechol). This causes fruit to turn brown when exposed to the air.

An experiment was carried out in which different concentrations of polyphenol oxidase were added to tubes containing catechol solution. The tubes were kept at a constant temperature and shaken periodically during the experiment.

The time taken for a standard brown colour to develop was recorded. The results are shown in the graph below.



(a) State the relationship between the variables as shown in these results. [2]

.....

.....

.....

Examiner only

(b) (i) Calculate the rate of the reaction at point **A** on the graph.

Rate is calculated as $\frac{1}{\text{time taken for brown colour to develop}}$ [1]

Rate = ... s^{-1}

(ii) State what factor would be limiting the reaction at point **A**. [1]

.....

(c) Banana puree is often given to young babies to eat, but it turns brown after preparation. Several methods can be used to prevent the puree from going brown.
Explain how each of the methods given below prevent this from happening.

I. Addition of lemon juice (citric acid) [2]

.....

.....

.....

II. Freezing immediately after preparation [2]

.....

.....

.....

III. Vacuum packing (air-free) [2]

.....

.....

.....

1071 010009

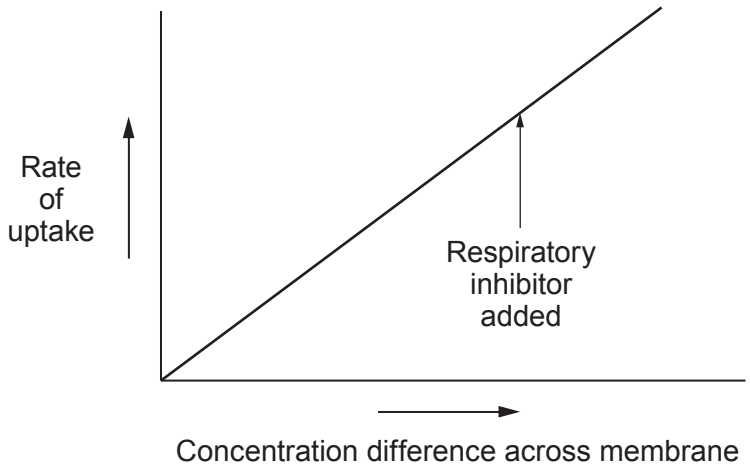
10

Examiner only

5. The following graphs show the effect of increasing the concentration gradient on the rate of uptake of substances across a cell membrane. The effect of adding a respiratory inhibitor on the rate of uptake is also shown.

For each graph, name the type of uptake involved and give reasons for your choice.

(a)



Type of uptake ..... [3]

Reasons for choice

.....

.....

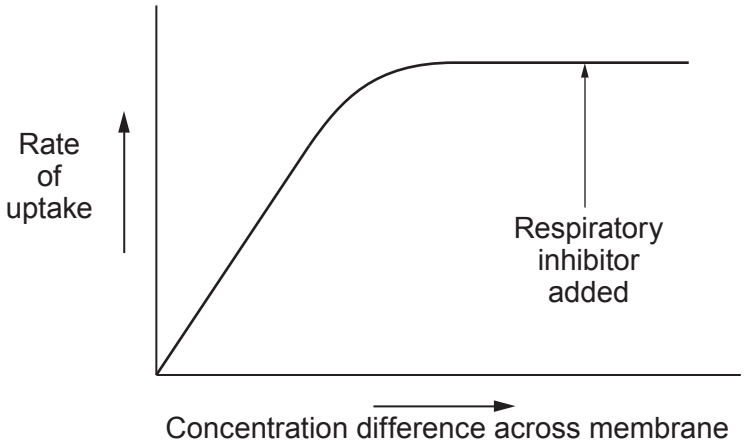
.....

.....

.....

Examiner only

(b)



Type of uptake ..... [3]

Reasons for choice

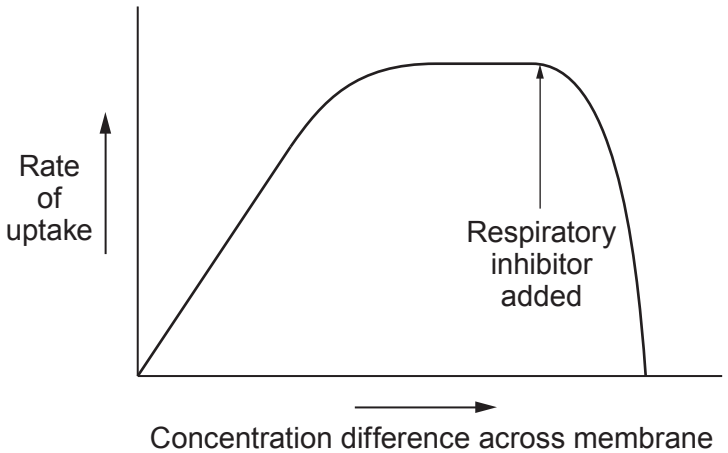
.....

.....

.....

.....

(c)



Type of uptake ..... [3]

Reasons for choice

.....

.....

.....

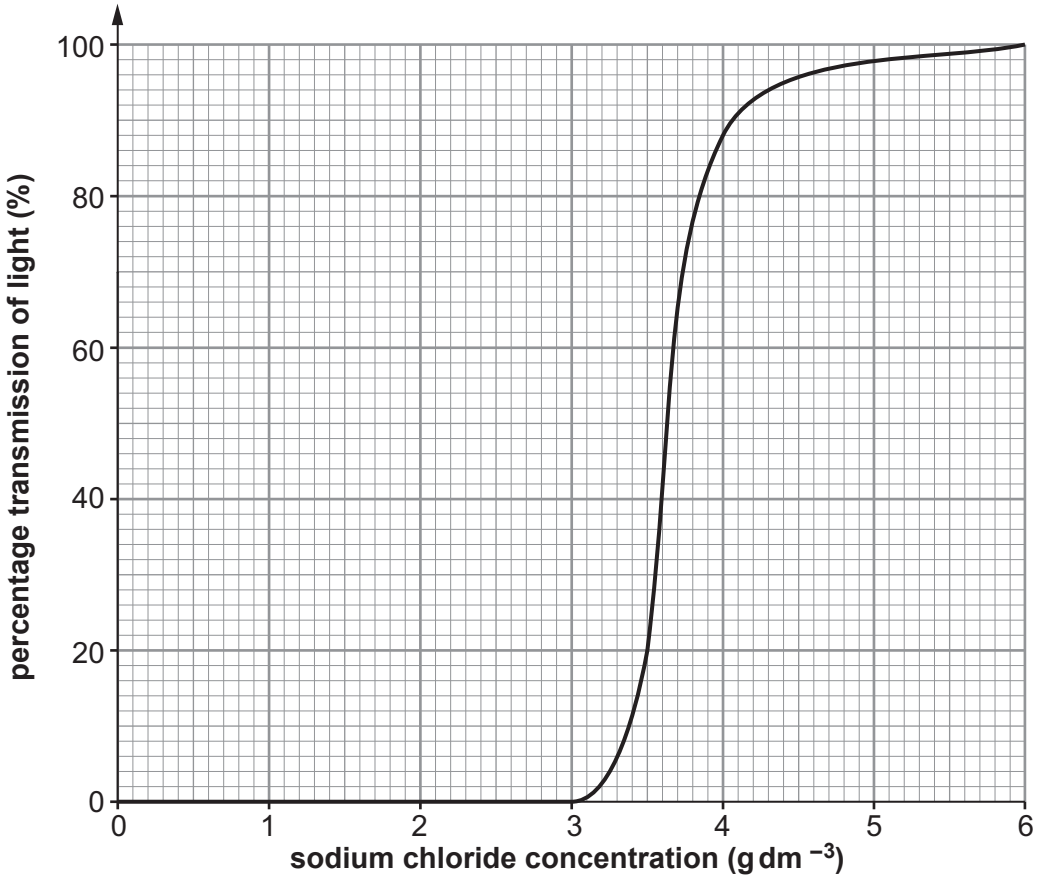
.....

9

Turn over.

Examiner only

6. *(a)* A student investigated the effect of sodium chloride concentration on the haemolysis of red blood cells. Red blood cells were mixed with a range of concentrations of sodium chloride solution for 30 minutes. The cell suspensions were then centrifuged to obtain cell free solutions. Any haemoglobin released from the cells would reduce the percentage transmission of light through the solution. Using a colorimeter, the percentage transmission was measured for each concentration. The results are shown in the graph below.



(i) Explain, in terms of water potential, why the percentage transmission was lowest between sodium chloride concentrations of 0 and 3 g dm^{-3}. [4]

.....

.....

.....

.....

.....

.....

.....

.....

.....

Examiner only

(ii) The graph shows that as the concentration of sodium chloride increases from 3 to 6 g dm^{-3} the number of haemolysed cells decreases. Explain why there is a range of concentrations at which haemolysis occurs. [2]

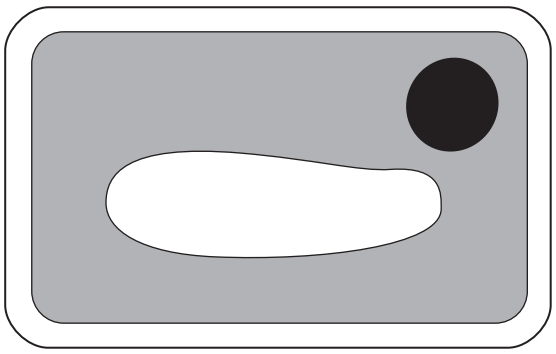
.....

.....

.....

.....

(b) The diagram below shows a plant cell that has been in pure water.



The cell was then placed in a concentrated salt solution for 30 minutes.

(i) Describe the differences that you would now observe in this cell. [3]

.....

.....

.....

.....

.....

.....

.....

.....

(ii) State the pressure potential of the cell after it had been in the concentrated salt solution for 30 minutes. [1]

.....

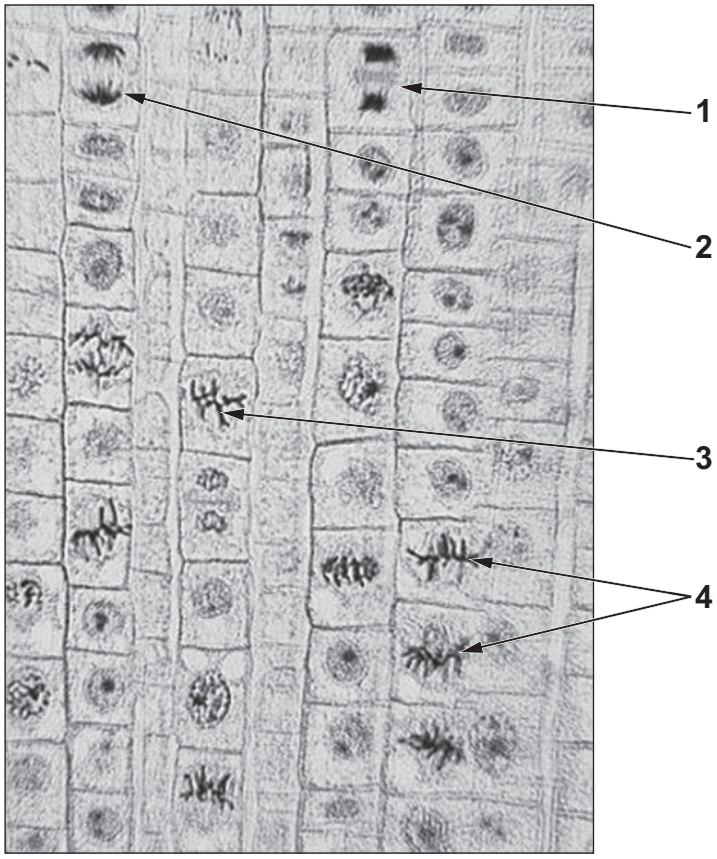
10

Examiner only

7. Answer **one** of the following questions.

Any diagrams included in your answer must be fully annotated.

Either, *(a)* The photomicrograph below shows a root tip squash. With reference to the cells labelled **1-4**, describe and explain the sequence of events in mitosis. [10]



Or, *(b)* Explain what is meant by an immobilised enzyme and with reference to suitable examples, discuss the advantages of their application in fields such as medicine and industry. [10]

.....

.....

.....

.....

.....

.....

Examiner only

Examiner only

Examiner only

END OF PAPER

10

Turn over.

BLANK PAGE

PLEASE DO NOT WRITE ON THIS PAGE

Question number	Additional page, if required. Write the question number(s) in the left-hand margin.

Examiner only

Question number	Additional page, if required. Write the question number(s) in the left-hand margin.

Examiner only

Question number	Additional page, if required. Write the question number(s) in the left-hand margin.

Examiner only

Question number	Additional page, if required. Write the question number(s) in the left-hand margin.

Examiner only

BLANK PAGE

PLEASE DO NOT WRITE ON THIS PAGE

BLANK PAGE

PLEASE DO NOT WRITE ON THIS PAGE