



GCE AS/A level

1071/01 – LEGACY

BIOLOGY/HUMAN BIOLOGY – BY1

P.M. THURSDAY, 26 May 2016

1 hour 30 minutes plus your additional time allowance

Surname _____

Other Names _____

Centre Number _____

Candidate Number 2 _____

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	

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 or your usual method.

Write your name, centre number and candidate number in the spaces on the front cover.

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.

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	

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

1(b)(ii) Describe one CELLULAR function of each of the following molecules. [2]

Triglyceride

Phospholipid

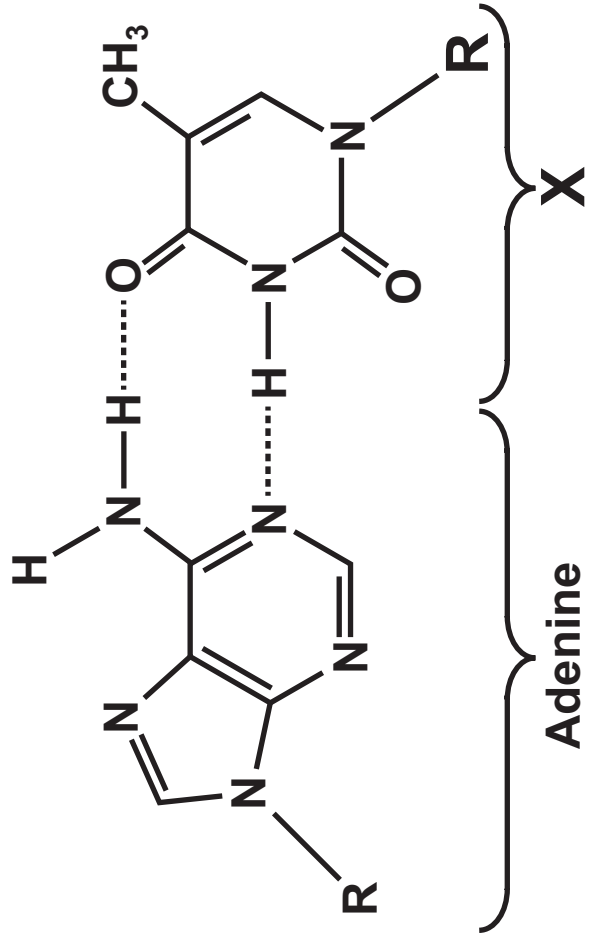
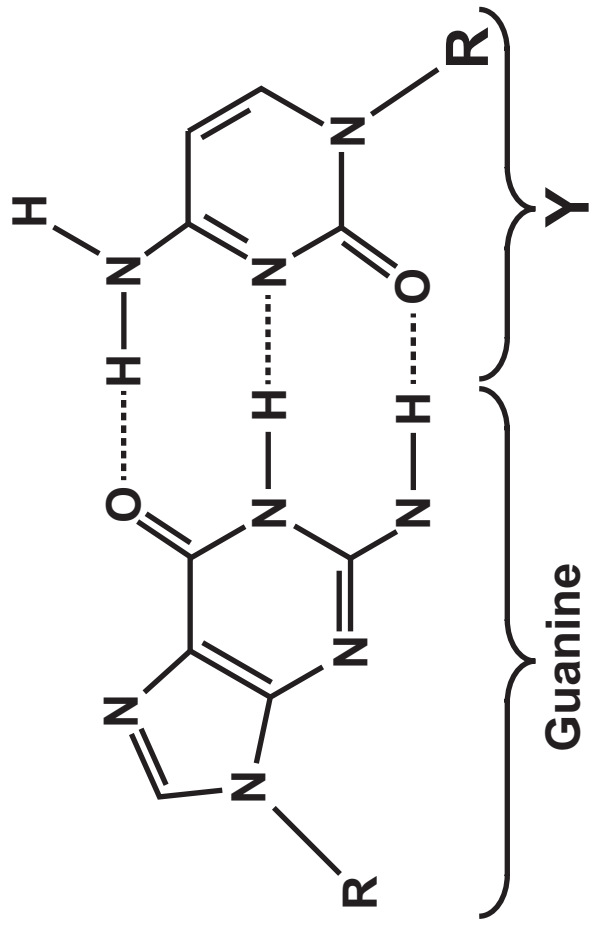
1(c) The diagrams opposite show the base pairing in DNA.

(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



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

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

A _____

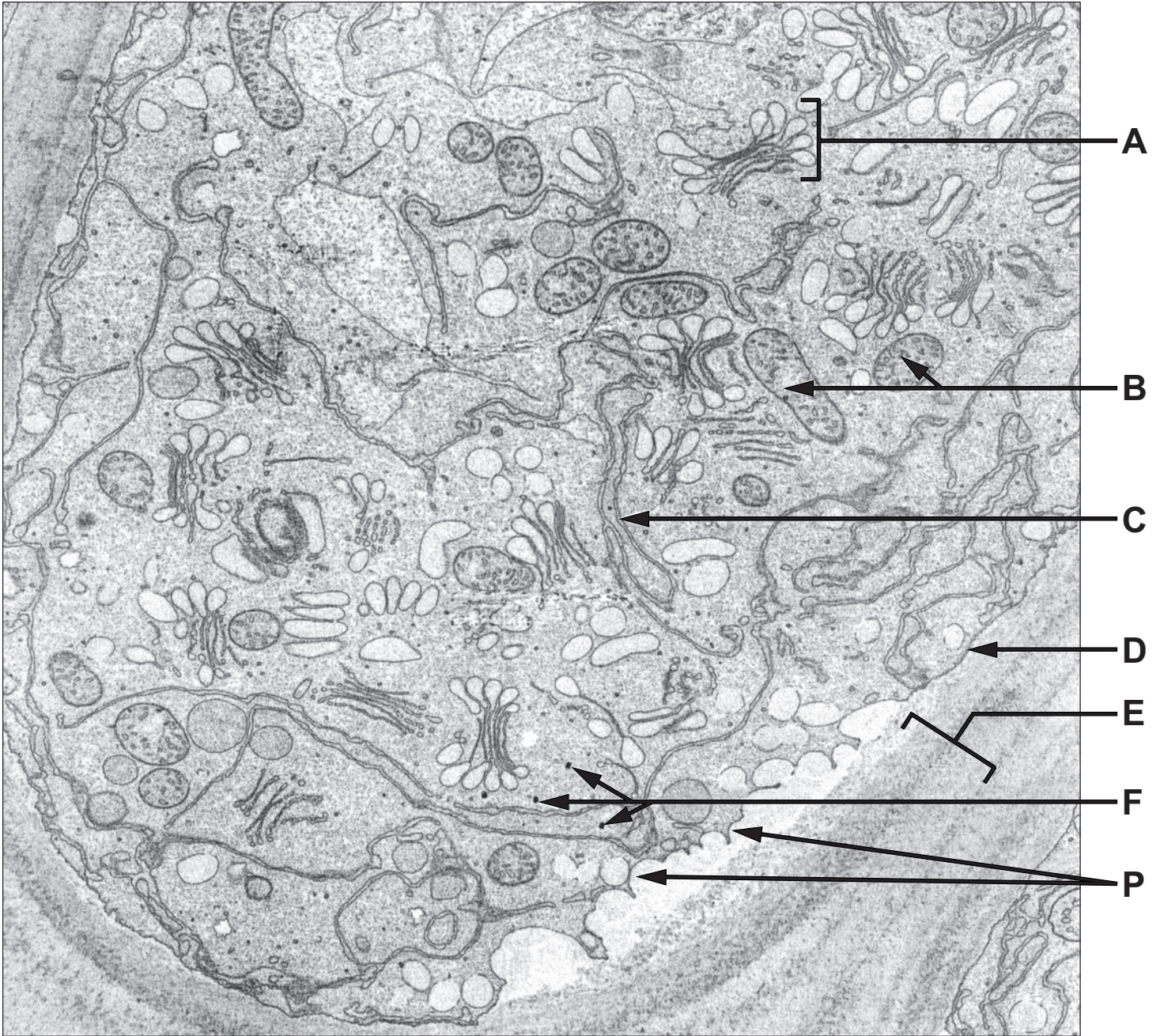
B _____

C _____

D _____

E _____

F _____



2(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]

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

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

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

COMPLETE THE TABLE below.

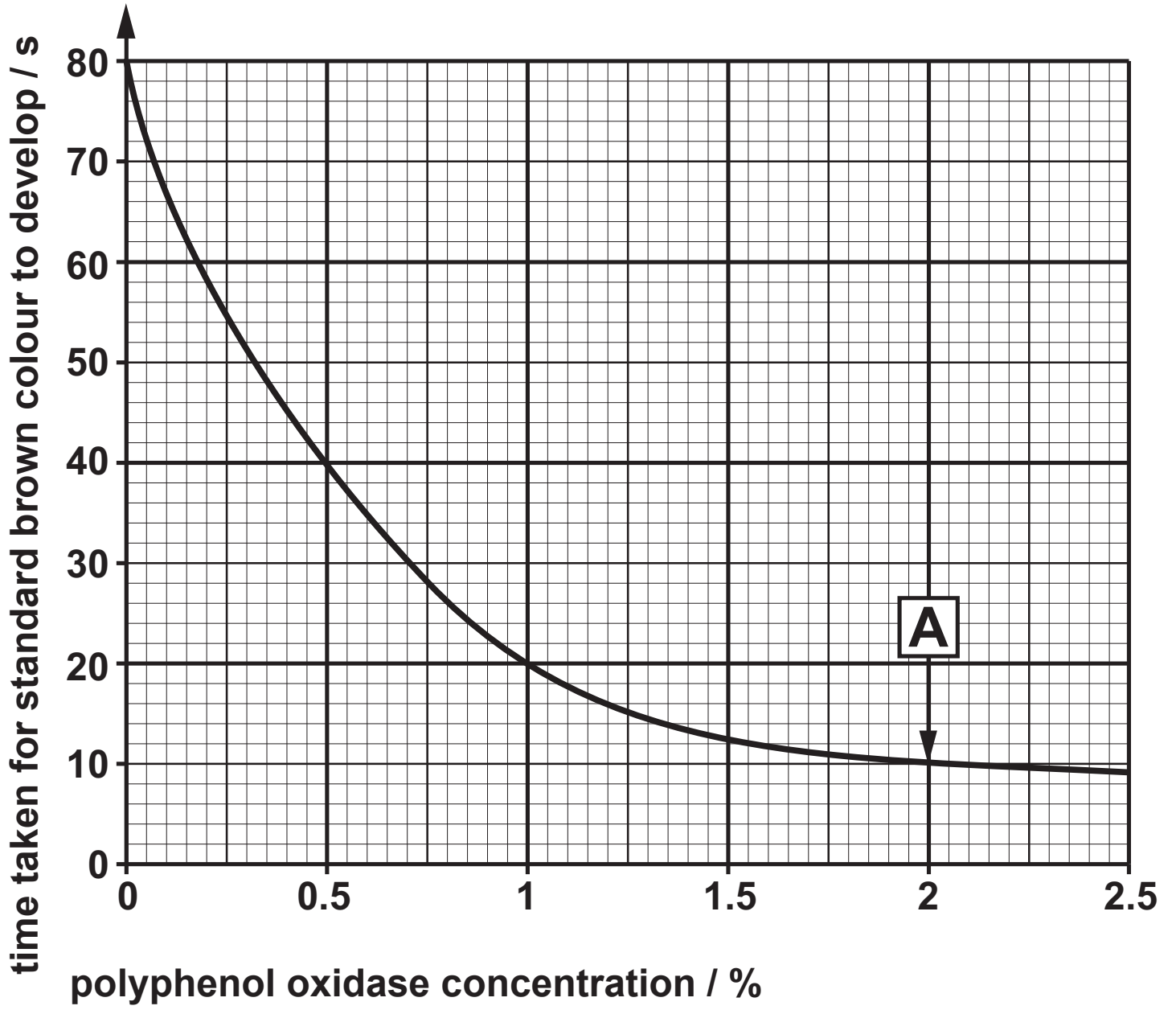
PROPERTY	BIOLOGICAL SIGNIFICANCE
ice less dense than water	
	has a role in cooling the body through sweating
cohesion between water molecules	
	minimises temperature fluctuation in aquatic habitats
dissolves ionic substances	

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 opposite.

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



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

Rate is calculated as

$$\frac{1}{\text{time taken for brown colour to develop}} \quad [1]$$

Rate = _____ s⁻¹

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

4(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]

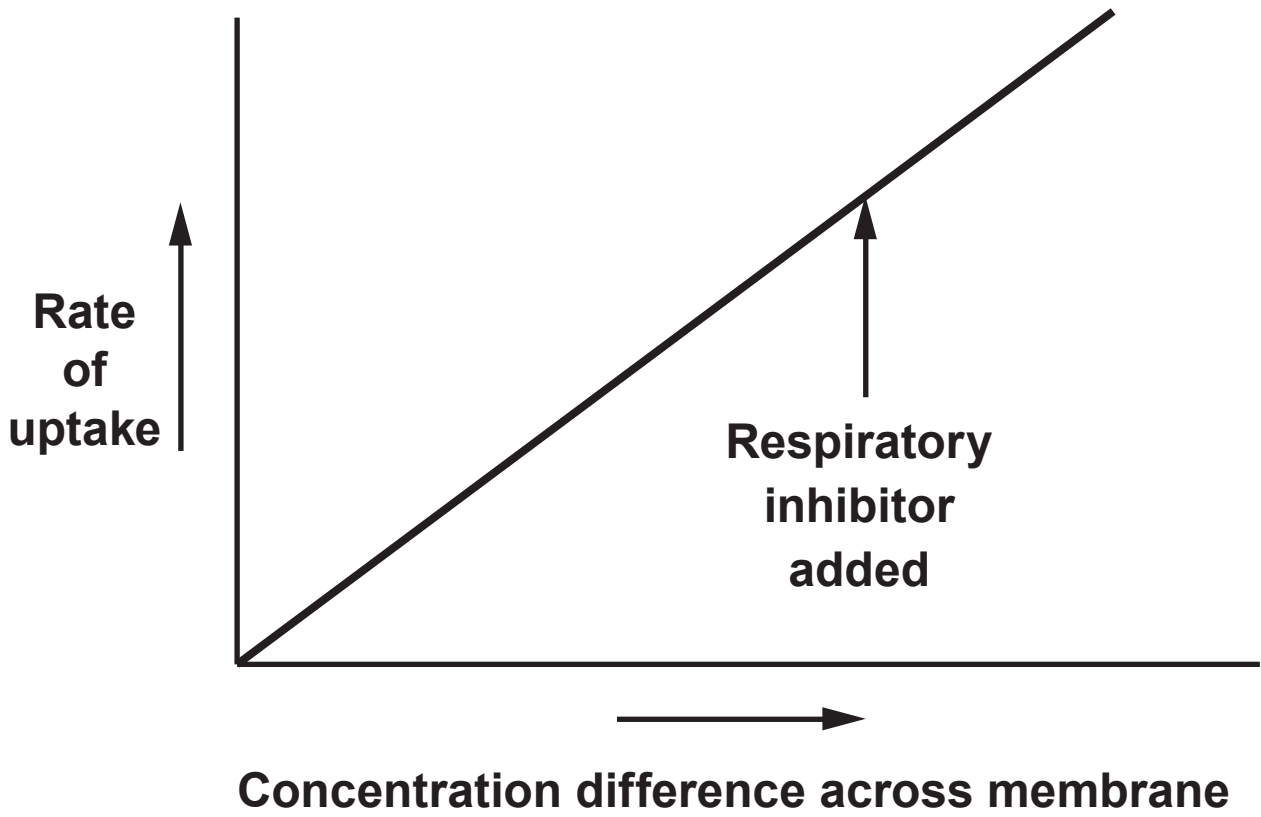
4(c) III. Vacuum packing (air-free) [2]

10

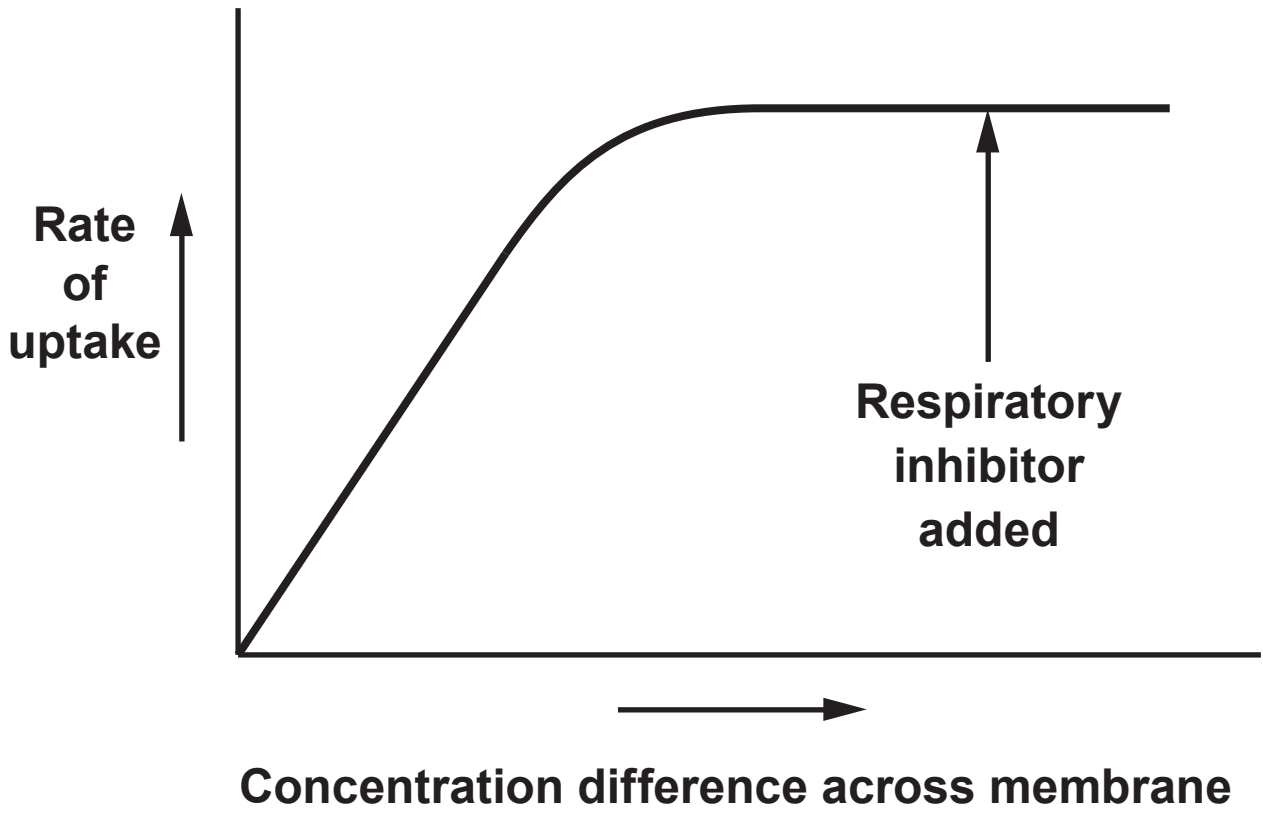
- 5. The following graphs show the effect of increasing the concentration gradient on the rate of uptake of substances across a cell membrane. The effect of adding a respiratory inhibitor on the rate of uptake is also shown.**

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

5(a)



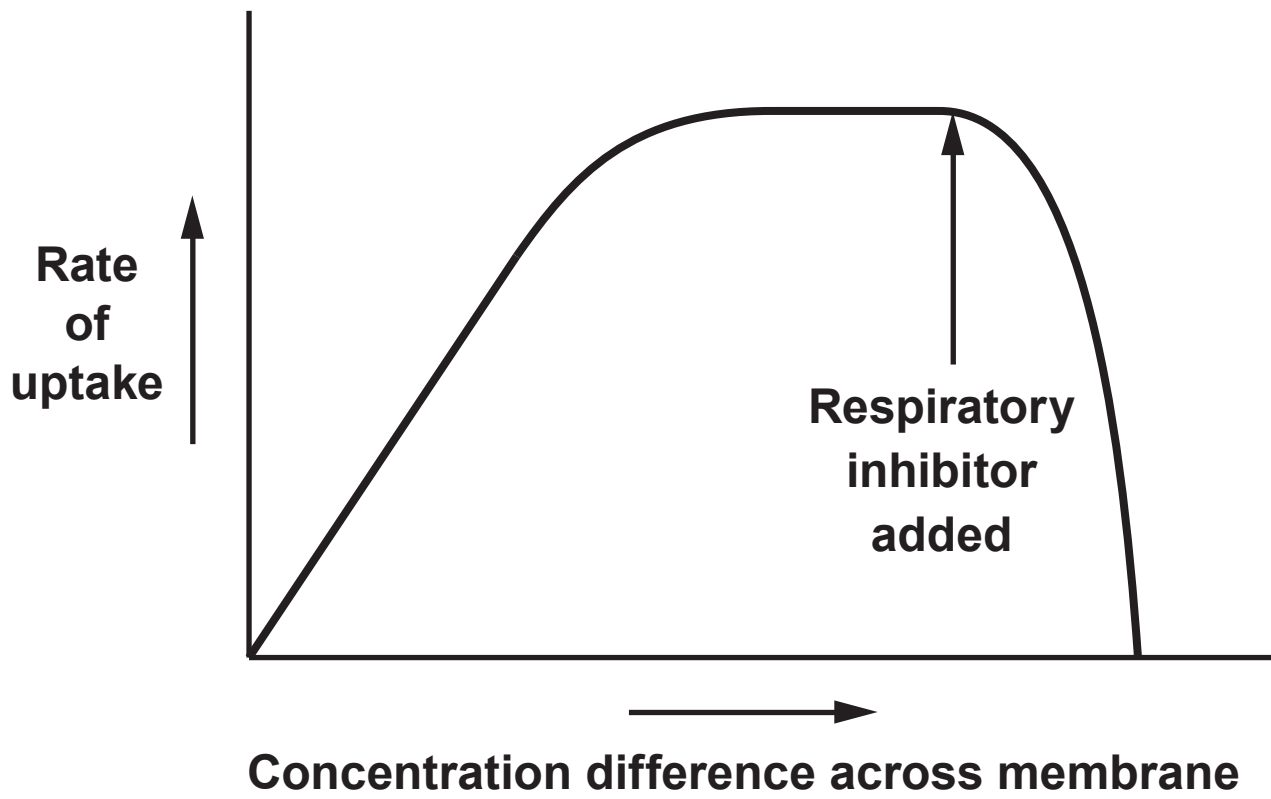
5(b)



Type of uptake _____ [3]

Reasons for choice

5(c)



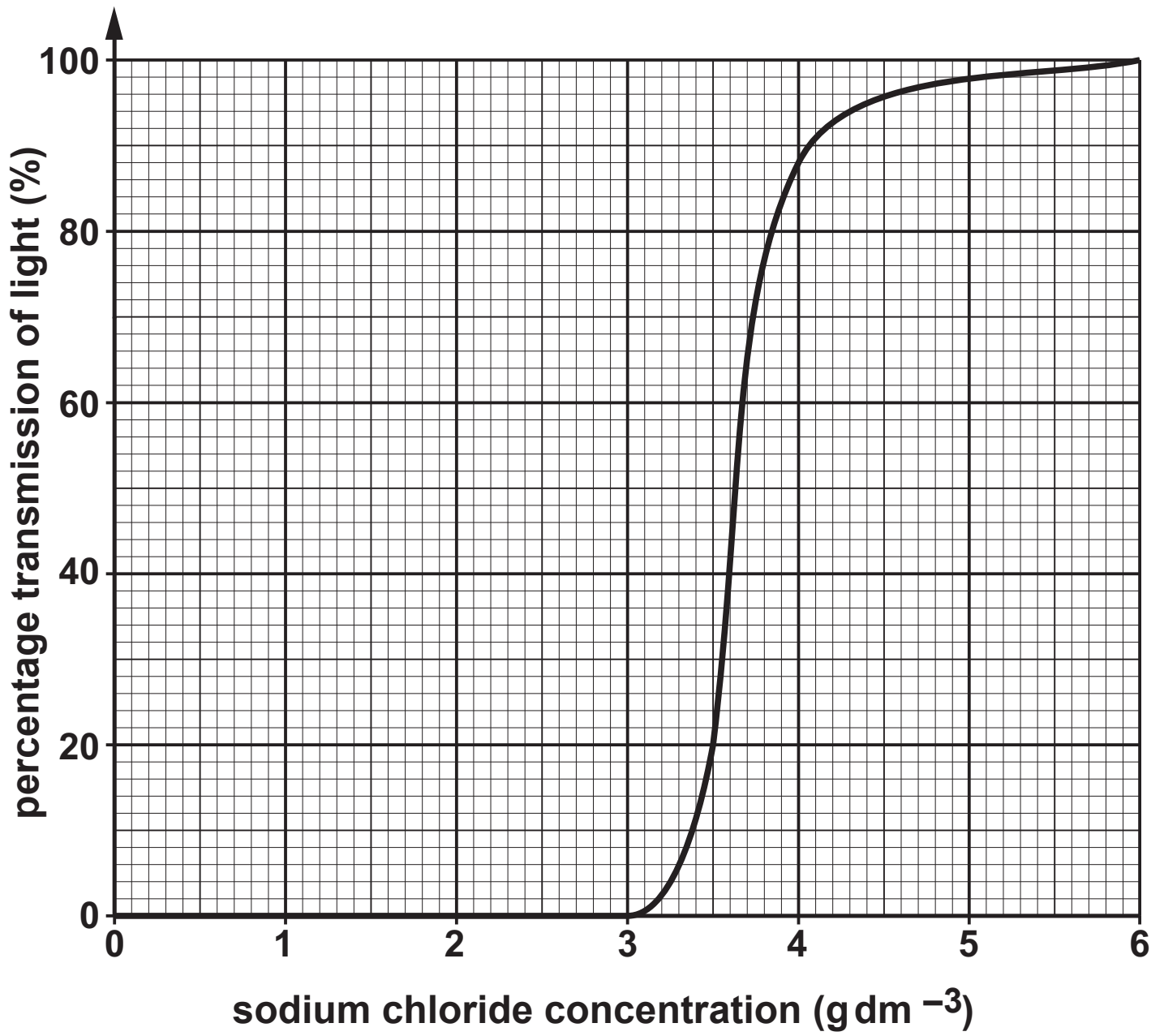
Type of uptake _____ [3]

Reasons for choice

9

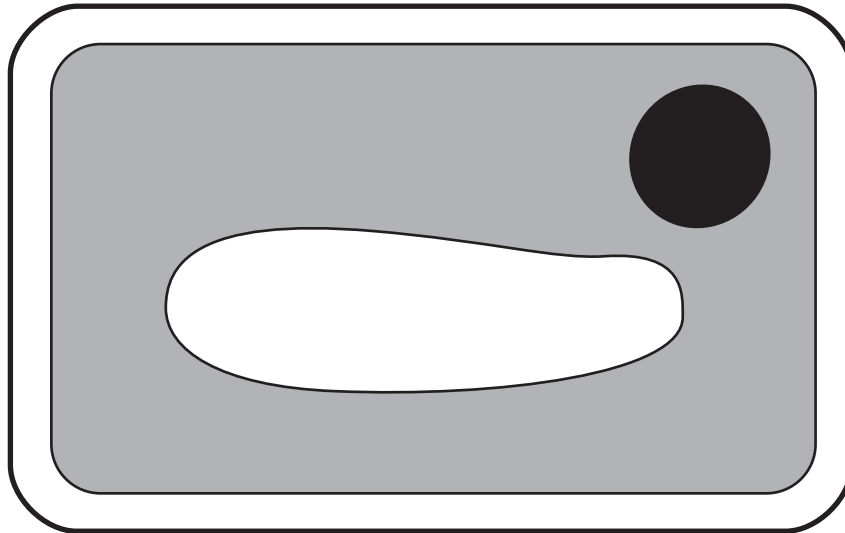
6(a) A student investigated the effect of sodium chloride concentration on the haemolysis of red blood cells. Red blood cells were mixed with a range of concentrations of sodium chloride solution for 30 minutes. The cell suspensions were then centrifuged to obtain cell free solutions. Any haemoglobin 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 opposite.

(a)(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]



6(a)(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]

6(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]

7. Answer ONE of the following questions.

Any diagrams included in your answer must be fully annotated.

Either, (a) The photomicrograph opposite 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]



1

2

3

4

