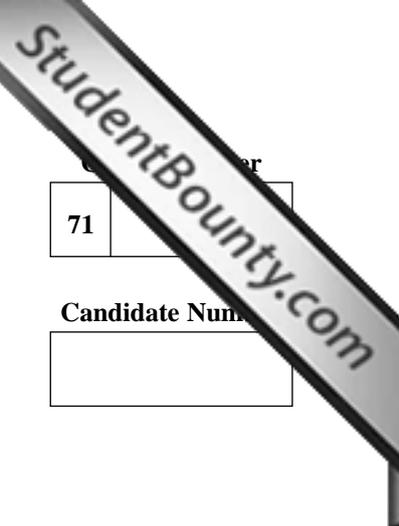




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ADVANCED SUBSIDIARY (AS)  
General Certificate of Education  
2009



71	
Candidate Number	
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## Biology

### Assessment Unit AS 3A

*assessing*

### Module 3A: Practical Processes

[ASB31]



FRIDAY 12 JUNE, AFTERNOON

#### TIME

1 hour.

#### INSTRUCTIONS TO CANDIDATES

Write your Centre Number and Candidate Number in the spaces provided at the top of this page.

Write your answers in the spaces provided in this question paper.

Answer **all five** questions.

You are provided with **Photograph 3.2** for use with Question 2 in this paper.

Do not write your answers on this photograph.

#### INFORMATION FOR CANDIDATES

The total mark for this paper is 50.

Quality of written communication will be assessed in questions **3(c)(i)**, **4(b)** and **5(b)** (denoted in the paper with an asterisk, \*), and awarded a maximum of 2 marks.

Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.

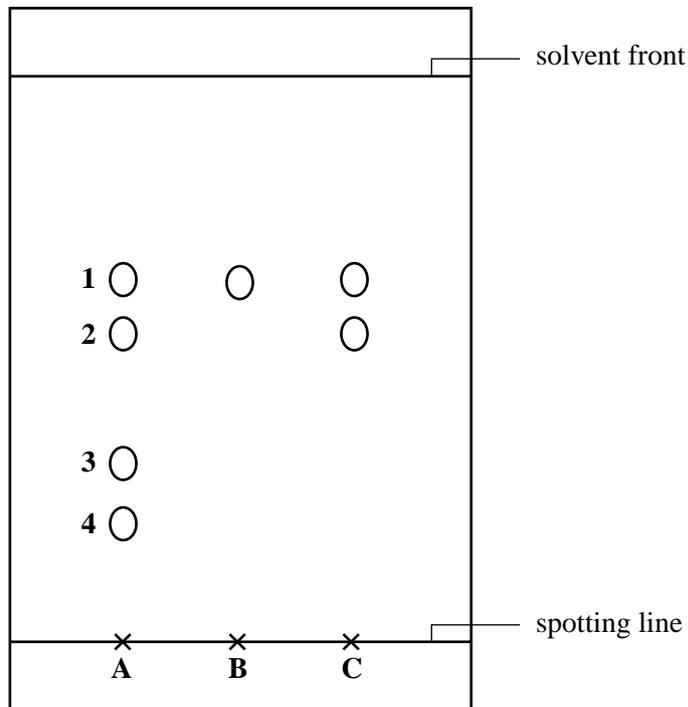
For Examiner's use only	
Question Number	Marks
1	
2	
3	
4	
5	
QWC	

<b>Total Marks</b>	
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1 Chromatography was used to separate three mixtures of sugars, **A**, **B** and **C**. The mixtures contained the following.

- A** – fructose, glucose, maltose and sucrose
- B** – products of hydrolysis of maltose
- C** – products of hydrolysis of sucrose

The diagram below shows the results.



(a) Maltose has an  $R_f$  value of 0.33. Determine which of the spots, **1** to **4** from mixture **A** represents maltose. (Show your working in the space below.)

Answer \_\_\_\_\_ [2]

- (b) Identify the other three spots from mixture **A** in the chromatogram. Explain your answers.

Identification

\_\_\_\_\_

Explanation

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_ [3]

- (c) The chromatogram was cut up so that each of the sugars, **1** to **4** from mixture **A**, was on a different piece of paper. Each of these was then added to a separate test tube containing some water to dissolve the sugar from the paper.

Explain how a simple biochemical test could be used to determine which of the four sugars is a non-reducing sugar.

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_ [2]

2 **Photograph 3.2** is a photomicrograph of a transverse section through a leaf of a tobacco plant (*Nicotiana tabacum*). The tobacco leaf has some xerophytic adaptations.

In the space below, draw a block diagram to show the tissue layers in the leaf as shown in the photograph. Annotate the drawing to identify **two** xerophytic features and, in each case, explain how the feature acts as an adaptation.



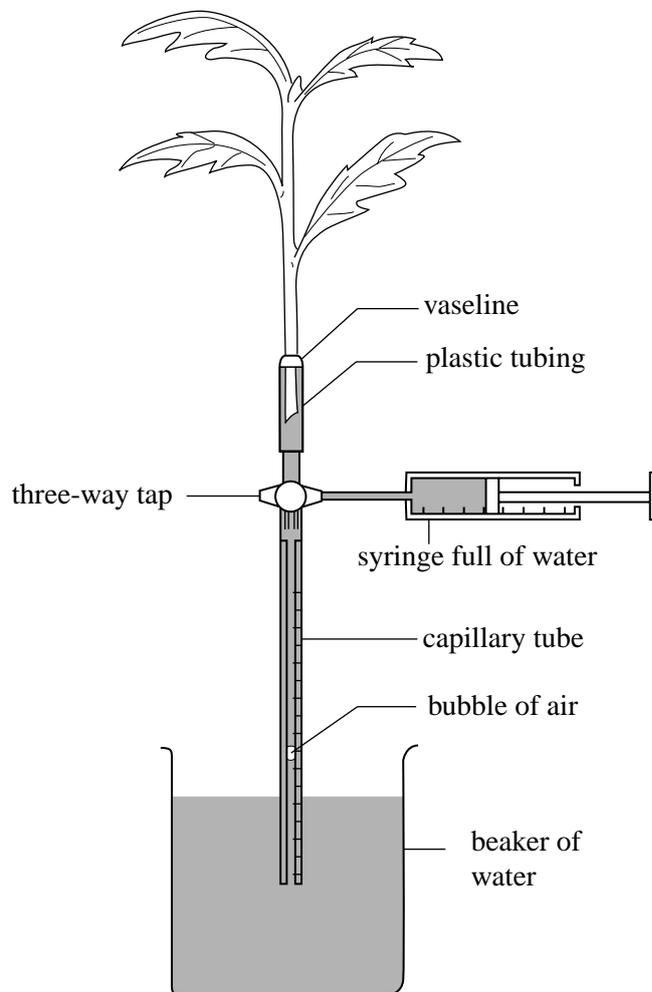
[9]

Examiner Only	
Marks	Remark

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**(Questions continue overleaf)**

3 A potometer is a device for investigating the rate of transpiration. Prior to setting up, the potometer and the stem of a leafy shoot are immersed in water. Under water, the bottom centimetre of the stem is cut off and the cut end inserted into the plastic tubing. The apparatus is removed from the water, a bubble of air allowed to enter the open end of the capillary tube and that end then inserted into a beaker of water. The completed set-up for a simple potometer is shown below.



© Reproduced with the permission of Nelson Thornes Ltd from *Practical Advanced Biology* by Tim King & Michael Reiss with Michael Roberts ISBN 0174483082 first published in 2001

(a) What assumption is made when this apparatus is used to investigate the rate of transpiration?

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[1]

(b) Explain each of the following.

- why it is necessary to cut the leafy shoot and fit it into the potometer under water

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- how the bubble of air is introduced into the capillary tube

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- why a syringe is attached

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- why the set-up is left for 15 minutes before taking readings

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[4]

(c) The table below shows some results recorded using the apparatus.

Time/minutes	Distance travelled by bubble/mm		
	'Normal' room conditions	Covered with clear plastic bag	Covered with black plastic bag
0	0	0	0
2	18	10	4
4	36	19	8
6	55	29	11
8	74	38	15
10	90	48	18

\* (i) Explain, as fully as possible, the results obtained.

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[3]

(ii) In 'normal' room conditions, the distance moved by the bubble was 90 mm during 10 minutes. The capillary tube has a cross sectional area of  $0.8 \text{ mm}^2$ . Calculate the rate of movement in  $\text{mm}^3 \text{ minute}^{-1}$ . (Show your working in the space below.)

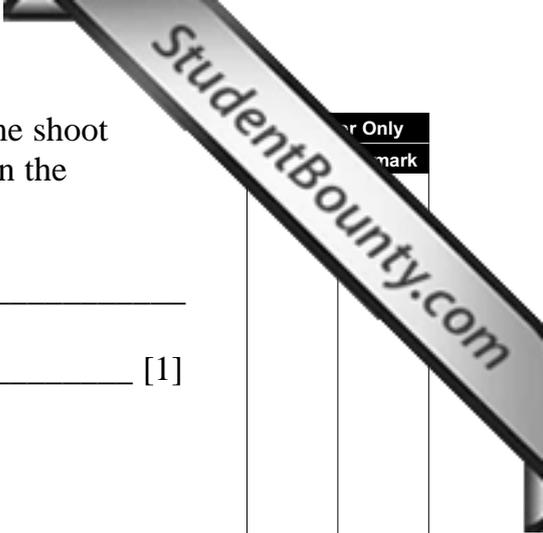
Answer \_\_\_\_\_  $\text{mm}^3 \text{ minute}^{-1}$  [2]

(d) In experiments using a potometer it is usual to use the same shoot throughout. Give **one** limitation of using different shoots in the potometer when investigating the rate of transpiration.

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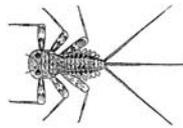
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[1]



Mark	Answer

- 4 Mayfly are common insects found in aquatic habitats. The adult lays eggs into water and these develop into larvae which remain aquatic for a year. Mayfly larvae have six legs each with a claw, three tails and gills along their abdomen through which they obtain oxygen from the water.



© A guide to freshwater invertebrate animals by T T Macan, published by Longmans, 1959, ISBN 058232274X, reproduced with the permission of Pearson Education Ltd, publishers.

Using a standardised sampling technique the numbers of mayfly larvae were determined at 10 sites along a stream. The speed of the water current was also estimated at each site. The results are shown in the table below.

<b>Number of mayfly larvae</b>	37	31	14	48	36	6	19	42	8	21
<b>Current speed /cm s<sup>-1</sup></b>	72	66	31	94	79	19	59	91	12	42

- (a) Plot the above results, using an appropriate graphical technique. (Use the graph paper opposite.) [6]

- \* (b) Describe the trend shown in the graph, and suggest an explanation for the trend.

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[3]

- (c) What problem would the mayfly larvae have to overcome in fast flowing streams? Suggest an adaptation that they might possess to overcome this problem.

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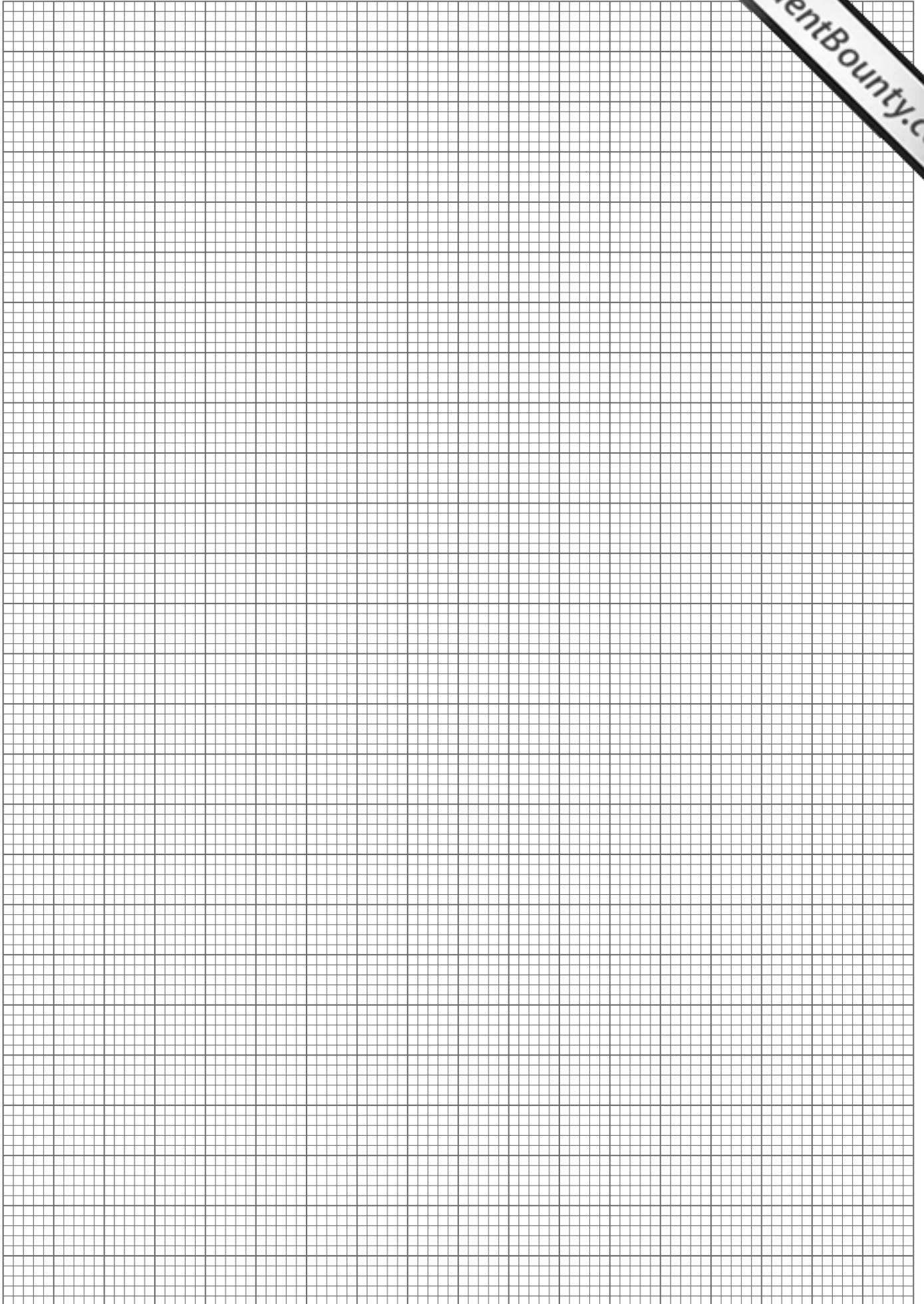


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[2]









**Photograph 3.2**

(for use with Question 2)



Source: Sinclair Stammers/Science Photo Library





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will be happy to rectify any omissions of acknowledgement in future if notified.