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General Certificate of Education
2010

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Centre Number
71

Candidate Number

Biology
Assessment Unit AS 2
assessing
Module 2: Organisms and Biodiversity
[AB121]



AB121

WEDNESDAY 16 JUNE, MORNING

TIME

1 hour 30 minutes.

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 nine** questions.

INFORMATION FOR CANDIDATES

The total mark for this paper is 75.

Section A carries 60 marks.

Section B carries 15 marks.

You are reminded of the need for good English and clear presentation in your answers.

Use accurate scientific terminology in all answers.

You should spend approximately **20 minutes** on Section B.

You are expected to answer Section B in continuous prose.

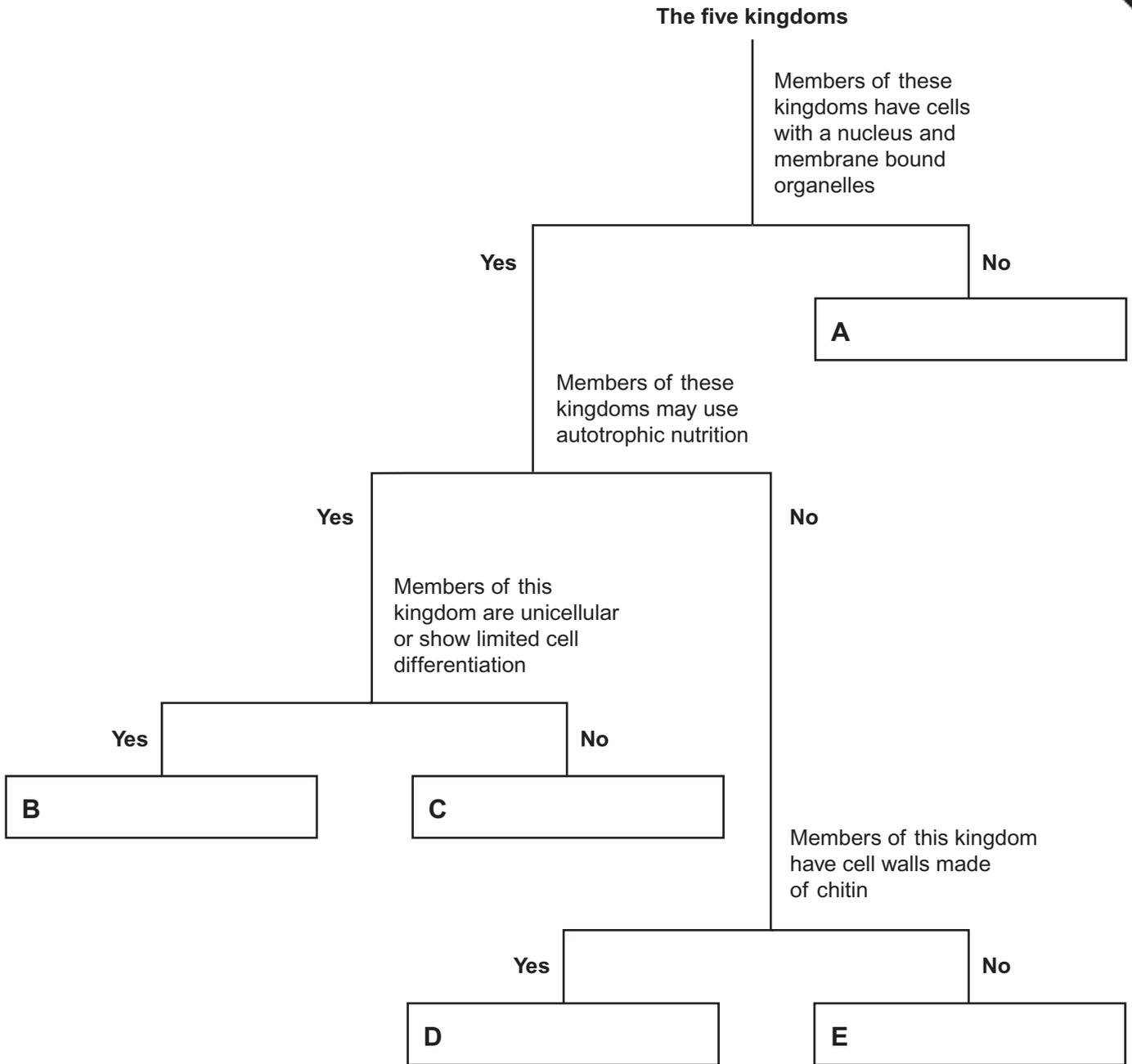
Quality of written communication will be assessed in **Section B**, and awarded a maximum of 2 marks.

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	
6	
7	
8	
9	
Total Marks	

Section A

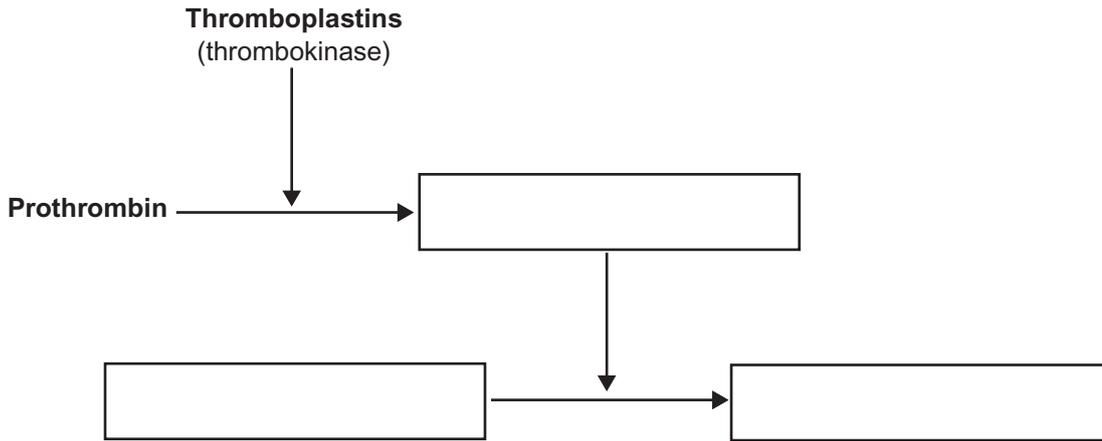
1 Use the dichotomous key below to help you identify the five kingdoms labelled **A** to **E**.



[5]

Examiner Only	
Marks	Remark

3 (a) The flow diagram below shows the mechanism of blood clotting.



Complete the diagram, by entering in the boxes, the names of the proteins involved in clotting. [3]

(b) Polymorphs are a type of the white blood cell. Describe the role of polymorphs at the site of a cut.

_____ [1]

4 Suggest reasons for the following features of the major blood vessels.

(a) Arteries near the heart have a lot of elastic fibres in their walls.

[2]

(b) Arteries within major organs have a lot of smooth muscle tissue.

[2]

(c) Veins possess valves.

[2]

- 5 An investigation was undertaken to determine the recovery of students of different athletic ability after a period of strenuous exercise.

Four students, two of them were athletic and two non-athletic, each ran 200 metres. Their pulses were counted immediately after the exercise.

Pulses were recorded for each consecutive 30 second period for a total of two minutes (so that for each student there are four recordings).

The pulses recorded are shown in the results below:

75, 55, 40, 30 and 78, 53, 42, 28 were recorded for the two athletes, while the non-athletes had pulses of 71, 64, 58, 39 and 67, 58, 46, 41.

- (a) Organise the results into an appropriate table. Your table should have a caption, suitable column headings, show units and include all the data.

[5]

(b) Suggest reasons for the following statements.

- The athletes had the higher pulse rates immediately after the exercise.

- The largest decrease in pulse was within the first minute for the athletes.

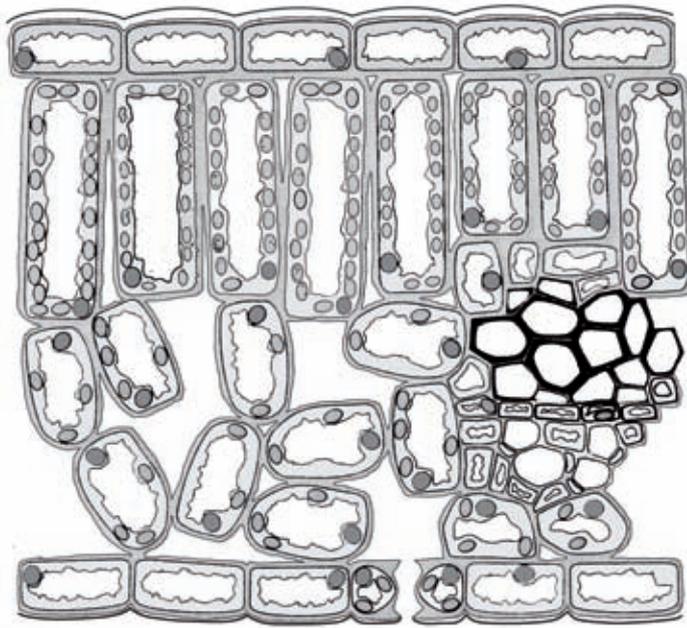
- The athletes had the lower pulse rates after $1\frac{1}{2}$ minutes.

- It would be more appropriate to compare percentage fall in pulse rates over the recovery period.

[4]

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- 6 The diagram below represents a transverse section through a mesophytic leaf as seen through the light microscope.



© *Advanced Biology* by G & M Jones, page 173, published by Cambridge University Press, 1997, ISBN 0521484731

- (a) Describe **three** ways in which the mesophytic leaf is adapted for the uptake of carbon dioxide.

1. _____

2. _____

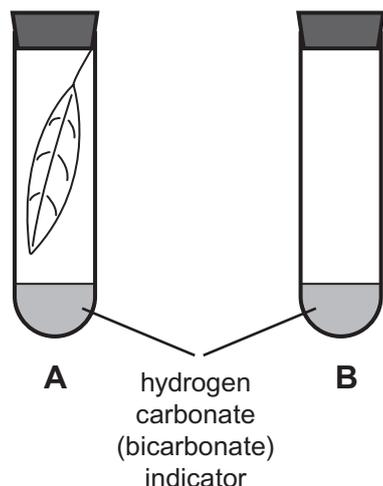
3. _____

_____ [3]

Hydrogen carbonate (bicarbonate) indicator can be used to illustrate changes in the concentration of atmospheric carbon dioxide. The colour changes are illustrated below:

Carbon dioxide levels raised [YELLOW] ← Normal carbon dioxide levels [ORANGE/RED] → Carbon dioxide levels lowered [PURPLE]

An experiment was carried out to investigate the light compensation point of a leaf. A pair of tubes, one containing a leaf (**A**) and the other without a leaf (**B**) was set up as shown in the diagram below.



This was repeated five times, and each pair of **A** and **B** tubes was illuminated at different light intensities for 30 minutes.

The hydrogen carbonate (bicarbonate) indicator was orange/red in both tubes initially, and remained orange/red in tube **B** at all light intensities. The colour of the solution in tube **A** at different light intensities is shown in the table below.

Resultant colour of indicator in tube A after 30 minutes	Light intensity/arbitrary units				
	1	4	8	16	64
	yellow	orange	orange/red	purple	purple

(b) Explain why the tubes were sealed during the experimental period.

[1]

(c) Explain the purpose of tube **B** at each of the light intensities.

[1]

(d) Explain the results of the experiment at light intensity 1.

[2]

(e) Use the results of this experiment to determine the light compensation point for this plant. Explain your answer.

[3]

7 (a) Xylem and phloem are both composite tissues with a variety of cell types.

(i) Describe the distribution of xylem and phloem tissues in the stem of a flowering plant.

[2]

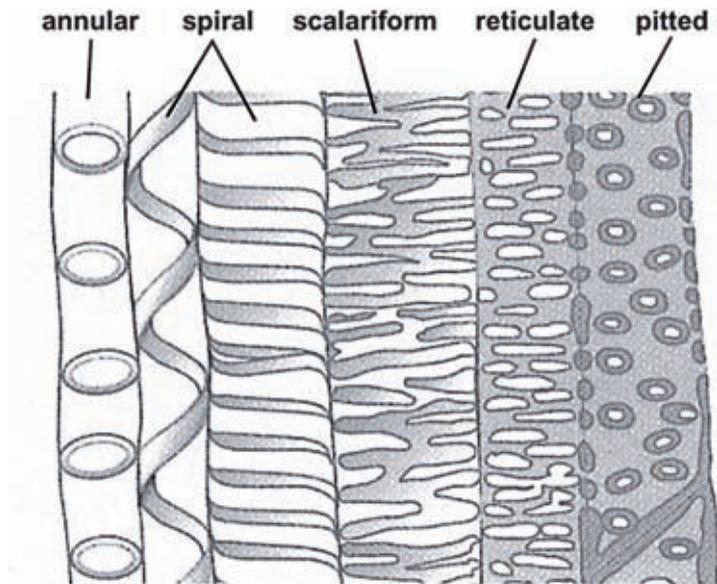
(ii) Phloem sieve tubes are the main cell type in phloem tissue. Describe **two** major features of phloem sieve tubes.

1. _____

2. _____

[2]

(b) The diagram below shows different forms of lignification patterns in xylem vessels.



© AS Level Biology by Phil Bradfield et al published by Longman, 2001, ISBN 0582429463. Reproduced by permission of Pearson Education Ltd.

(i) Explain why the added strength which lignin provides in the xylem vessels is necessary for their functioning.

[2]

(ii) Suggest why the xylem vessels in young stems have rings or spirals of lignin whereas older stems will have scalariform or reticulate walls.

[2]

(iii) Explain why pits are necessary in the xylem vessel walls.

[1]

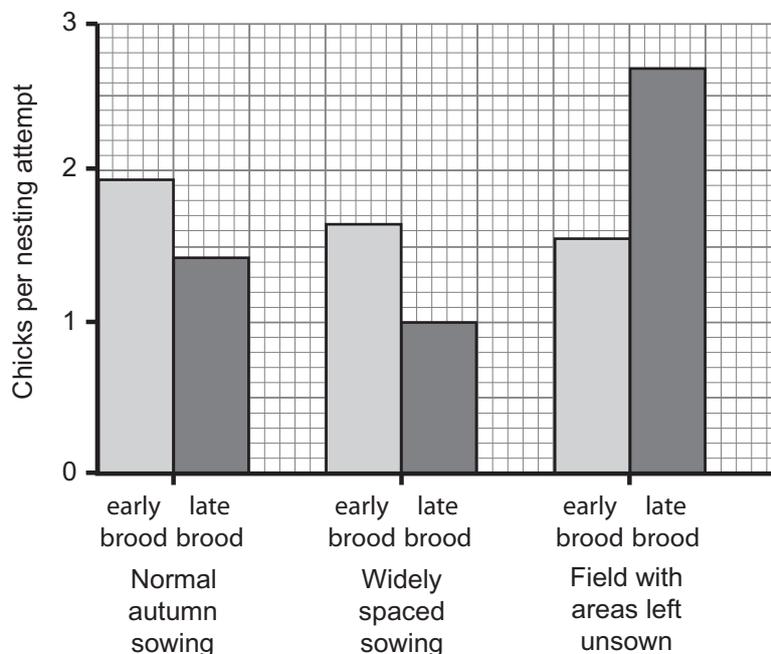
8 Farmland birds are an important measure of the biodiversity of the countryside. Population numbers and ranges of many familiar birds have halved since 1970.

Changes in farm practice have been the major causes for the decline of many species such as the skylark, *Alauda arvensis*. The skylark is an insect-feeding bird and nests on the ground producing two broods during the year. An early brood is produced in April/May while a late brood is produced in July/August. Skylarks frequently nest in wheat fields and their decline is associated with a change towards planting wheat seed in the previous autumn rather than in the spring. This change has meant that the ground is covered in wheat earlier in the year – wheat sown in autumn is in full leaf at the beginning of June, forming a dense 60cm high “closed canopy”. This is good for the farmers in that they can harvest their crop earlier in the year, but poor for the skylarks which need an open area in which to nest successfully.

In 2002, trials of two alternative sowing strategies designed to improve the nesting success of skylarks were carried out. These and the control are described below.

- Normal autumn sowing with early closure of the canopy in June (control)
- Autumn sowing, but seeds more widely spaced, causing later closure of the canopy
- Autumn sowing, but with areas within the field which were left unsown and kept open throughout the year.

The graph below shows the success of rearing chicks in each of the two broods (early and late) and in each of the different trials.



(a) (i) Which of the strategies would be recommended for improving the breeding success of skylarks? Explain your answer.

[2]

(ii) Describe **two other** trends evident in the graph.

1. _____

2. _____

[2]

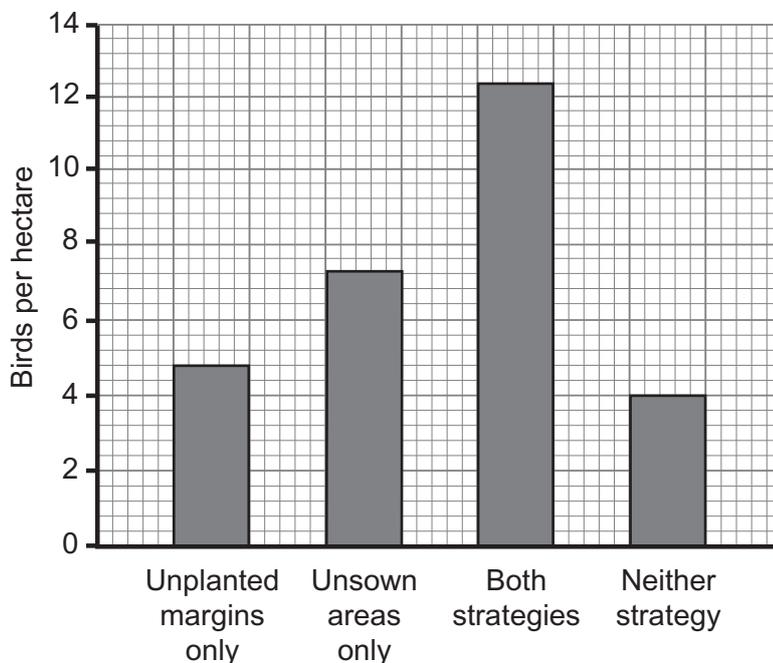
(b) The table below shows the average numbers of ground insects caught in pit-fall traps in the fields used in these trials.

	Normal autumn sowing	Widely spaced sowing	Field with areas left unsown
Mean number of insects per pit-fall trap	4.6	6.0	9.3

Suggest how these results may be related to the success of rearing chicks.

[2]

(c) Another strategy to improve conditions for farmland birds was to leave field margins unplanted. The success of this strategy was then tested alongside the strategy of leaving unsown areas within the field. The total number of birds of different species, in fields which had either unplanted margins or unsown areas or had both strategies or had neither strategy, were counted. The results are shown in the graph below.



(i) Calculate the percentage increase in the total number of farmland birds in fields with both strategies used in comparison to fields with neither strategy used. (Show your working.)

Answer _____ [3]

(ii) Describe the data that you would need from this research to calculate a biodiversity index for farmland birds such as Simpson's Index.

[2]

(iii) The formula for the Simpson's Index is provided below:

$$D = \frac{\sum n_i(n_i - 1)}{N(N - 1)}$$

Suggest how values for Simpson's Index for farmland birds might have changed since changes in farm practice were introduced.

[2]

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