



ADVANCED SUBSIDIARY (AS)
General Certificate of Education
January 2013

Centre Number

71

Candidate Number

Biology
Assessment Unit AS 2
assessing
Organisms and Biodiversity

[AB121]



TUESDAY 15 JANUARY, AFTERNOON

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. There is an extra lined page at the end of the paper if required.

Answer **all nine** questions.

You are provided with **Photograph 2.5** for use with **Question 5** in this paper. Do not write your answers on this photograph.

INFORMATION FOR CANDIDATES

The total mark for this paper is 75.

Section A carries 60 marks. Section B carries 15 marks.

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

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.

For Examiner's
use only

Question Number	Marks
1	
2	
3	
4	
5	
6	
7	
8	
9	

Total
Marks

[4]

Examiner Only	
Marks	Remark

- Drainage _____

- Ploughing _____

- Reseeding _____

_____ [3]

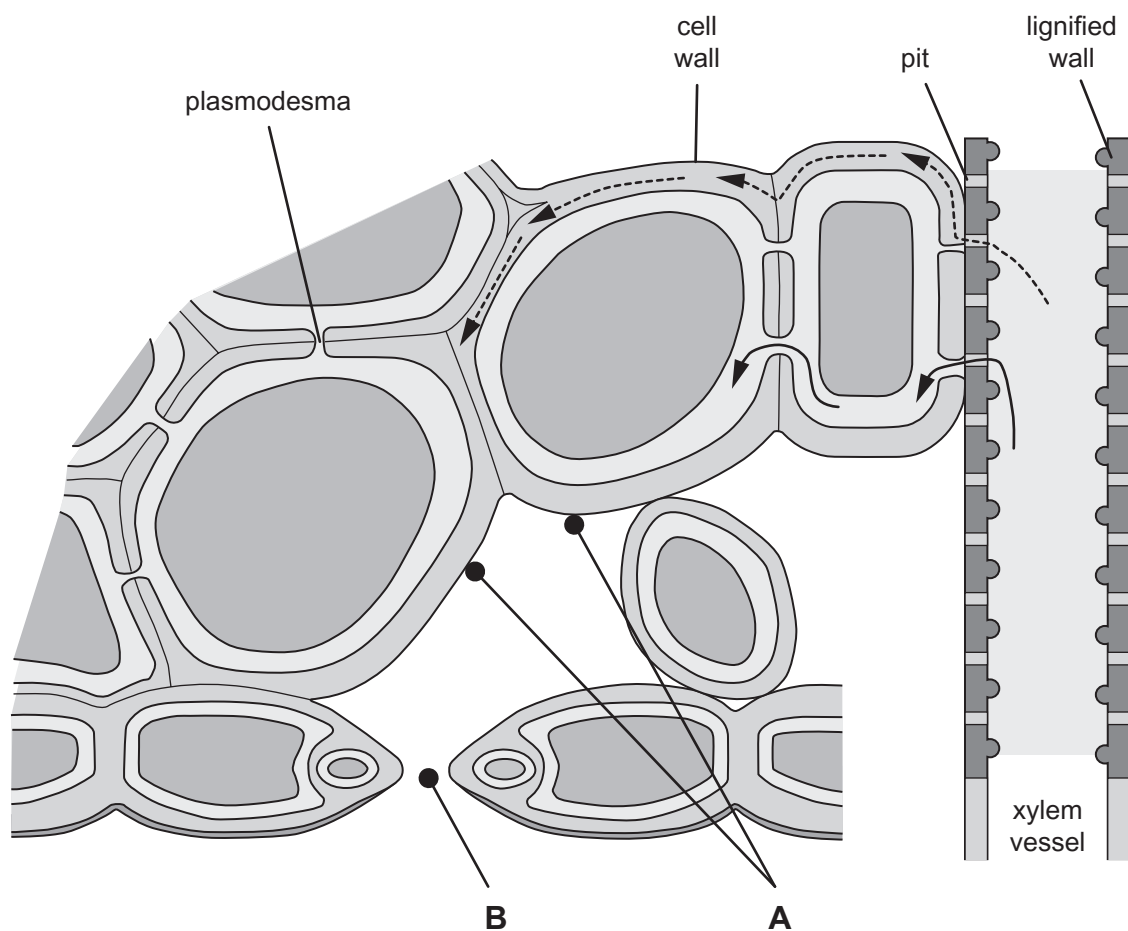
(b) Describe **two** distinct ways in which the biodiversity of farmland may be improved. (Your answer should not refer to drainage, ploughing or reseedling.)

1. _____

2. _____ [2]

Examiner Only	
Marks	Remark

- 3 In a mesophytic leaf, water leaves the xylem and moves to other areas. The diagram below shows two possible pathways taken by water after leaving the xylem vessel.



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- (a) Identify the **two** pathways for water movement shown in the diagram.

—————▶ _____
 - - - - -▶ _____

[2]

(b) The following features have a role in the transport of water in the plant. Describe **one** role for each feature.

- Plasmodesma _____

- Pit _____

- Lignified wall _____
_____ [3]

(c) The movement of water through the leaf depends on processes at **A** and **B**. Identify these processes.

A _____

B _____

[2]

Examiner Only	
Marks	Remark

(i) Describe how quadrats would be positioned in the following situations.

- A population which is scattered evenly throughout the area to be sampled.

- A population that varies in abundance as you move from one side of the area to be sampled to the other.

[2]

(ii) Within a quadrat individual plants are often difficult to distinguish. Describe how plant abundance may then be estimated.

[1]

(b) Students were asked to compare the length of a particular species of seaweed on two areas of a rocky shore. One student selected three specimens from each shore area, measured their lengths and from these calculated the mean length of seaweed for each area.

(i) This student's means are unlikely to be a reliable representation of the mean length of the entire population of the seaweed for each area. Explain why the student's means are unlikely to be reliable. Describe how reliability could have been improved.

[2]

(ii) Suggest **one** way in which the validity of this investigation might be improved.

[1]

Examiner Only	
Marks	Remark

C

[3]

 [2]

 [3]

[1]

Examiner Only	
Marks	Remark

6 (a) Define the term 'species'.

 [2]

(b) Duckweed is a tiny hydrophyte found floating or slightly submerged in ponds. The plant consists of a green frond, not differentiated into stem and leaves, and one or more roots. There are four native Irish duckweed species.

(i) Species are often identified with the use of a dichotomous key. A dichotomous key separates organisms into groups until individual species have been described. The table below shows features which may be used in the construction of a dichotomous key for the identification of the duckweed species.

Species	Single root	Round frond	Convex lower surface
<i>Lemna minor</i>	✓	✓	✗
<i>Spirodela polyrhiza</i>	✗	✓	✗
<i>Lemna gibba</i>	✓	✓	✓
<i>Lemna triscula</i>	✓	✗	✗

Using the information in the table, complete a dichotomous key for the duckweed species. A suitable key has been started for you.

1 Single root → 2
 more than one root → *Spirodela polyrhiza*

2

[3]

- (i) Calculate the surface area and volume of this cube-shaped organism.

Volume _____ μm^3
[2]

(ii) Calculate the total volume of oxygen absorbed and consumed in one minute at rest.

Oxygen consumed at rest _____ μm^3
[2]

-
-
-
-
- [2]

-
-
-
-
- [2]

10

Large organisms require specialised gas exchange surfaces.

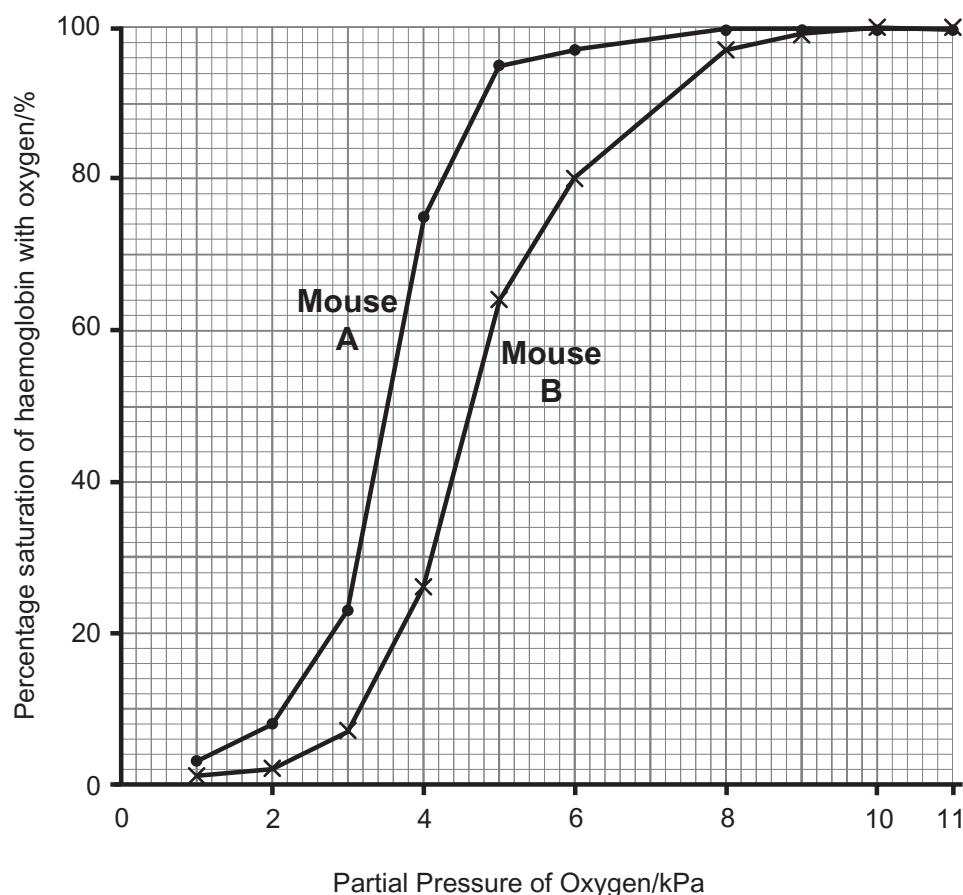
(b) Describe how a large gas exchange surface is achieved in a mammal.

[2]

Examiner Only	
Marks	Remark

- 8 (a) Deer mice (*Peromyscus maniculatus*) populate much of the United States, inhabiting the widest range of altitudes of any North American mammal. Two types of deer mice are recognised, those adapted to life at high altitude and those at low altitude. Most importantly they possess different types of haemoglobin.

The graph below shows haemoglobin dissociation curves for a high altitude mouse and a low altitude mouse.



- (i) State what is meant by the term 'percentage saturation'.

_____ [1]

- (ii) Using the haemoglobin dissociation curves, determine the difference in percentage saturation of the haemoglobin of mice **A** and **B** at a partial pressure of $O_2 = 5\text{kPa}$.

Difference in % saturation _____ [1]

(iii) Increased levels of nitric oxide

[2]

Examiner Only	
Marks	Remark

[illegible]

Examiner Only	
Marks	Remark

Examiner Only	
Marks	Remark

THIS IS THE END OF THE QUESTION PAPER

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GCE Biology Advanced Subsidiary (AS)
Assessment Unit AS 2: Organisms and Biodiversity
January 2013

Photograph 2.5
(for use with Question 5)

