



Rewarding Learning

ADVANCED SUBSIDIARY (AS)
General Certificate of Education
2014

Centre Number

71

Candidate Number

Biology

Assessment Unit AS 2

assessing

Organisms and Biodiversity

[AB121]

FRIDAY 20 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.

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

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- Complete the table below by placing a tick (✓) in the appropriate boxes to describe factors which would promote a **high** diffusion rate.

Factor	Large	Small
Surface area of the membrane		
Thickness of the membrane		
Concentration gradient across the membrane		

Examiner Only	
Marks	Remark

(a) Upper Lough Erne has the designation SAC. What do these letters represent?

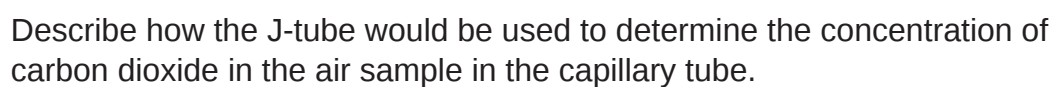
(b) With reference to the information given above, suggest **two** reasons why Upper Lough Erne has been designated as an SAC.

[2]

(c) The Department of Agriculture and Rural Development recommends that, to improve biodiversity, native species such as hawthorn are used when planting new hedgerows on farmland. Suggest why such species are preferred over non-native species.

[1]

8976



[5]

[5]

8976

-
-
- [1]

	Grazed area	Non-grazed area
Simpson's Index (D)	0.32	0.56

-
-
-
-
- [2]

6

5 **Photograph 2.5** shows a bracket fungus (*Trametes versicolor*) which is commonly found growing on dead woodland trees such as oak or beech. Like all fungi, *Trametes versicolor* is a lysotroph.

(a) Define the term 'lysotroph'.

[1]

(b) This bracket fungus is partially covered by another organism (**A**) which is a member of the genus, *Sphagnum*. Using a feature clearly visible in the photograph, identify the kingdom to which *Sphagnum* belongs and give a reason for your choice.

[2]

Most of the fungus is composed of many strands of thin hyphae which are found within the trunk of the tree stump. The externally observable 'bracket' is the reproductive structure, which produces spores in late summer and early autumn. The spores are blown away by the wind and, if they land on a suitable food source, will germinate in warm damp conditions.

(c) Using this information, explain **three** adaptations of this fungus.

[3]

Examiner Only	
Marks	Remark

[3]

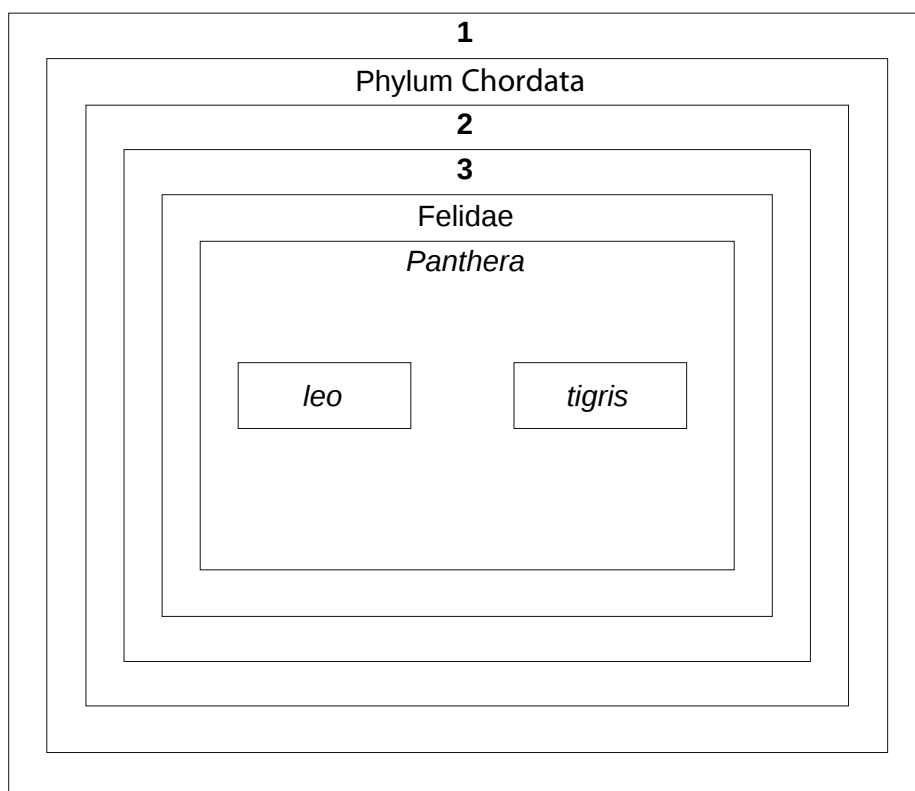
Examiner Only	
Marks	Remark

- 6 Under the binomial nomenclature system, the lion is classified as *Panthera leo* and the tiger as *Panthera tigris*. Both species are members of the family Felidae, the class Mammalia, and the order Carnivora.

(a) In the context of classification, define the term 'order'.

_____ [1]

A diagrammatic representation of the taxonomy of the lion and tiger is shown below. Each box represents a different taxonomic grouping.



(b) Identify the taxonomic groupings represented by the numbers:

1 _____

2 _____

3 _____

[3]

(c) Captive male lions and female tigers in zoos and wildlife parks have been bred with each other producing offspring which are known as ligers. Suggest why no liger populations exist in the wild.

_____ [1]

Classifying lions and tigers in this way is an example of phylogenetic taxonomy.

One method used to undertake phylogenetic taxonomy is to compare the primary structure of proteins.

Cytochrome-c is a protein involved in respiration, and is found in all eukaryotes. There are over one hundred amino acids in this protein and analysing the amino acid sequence can be used to suggest evolutionary relationships between organisms.

A partial amino acid sequence (amino acids from positions 60 to 69) of cytochrome-c in four organisms is shown in the table below.

Position Organism	Amino acid									
	60	61	62	63	64	65	66	67	68	69
Human	Asp	Lys	Asp	Lys	Gly	Ile	Ile	Try	Glu	Asp
Rhesus monkey	Asp	Lys	Asp	Lys	Gly	Thr	Ile	Try	Glu	Asp
Chicken	Asp	Lys	Asp	Glu	Gly	Thr	Ile	Try	Glu	Asp
Silkworm	Asp	Lys	Ala	Phe	Gly	Thr	Ile	Try	Asp	Asp

- (d) (i) Suggest **one** reason why cytochrome-c is a suitable protein to use for this type of study.

_____ [1]

- (ii) Identify the amino acid positions at which the sequences of the chicken and the silkworm differ.

_____ [1]

- (iii) Calculate the percentage of amino acids which differ between the sequences of the chicken and the silkworm.
(Show your working.)

Answer _____% [2]

Examiner Only

Marks Remark

- (iv) The amino acid sequences for the human and the Rhesus monkey differ by 10%, whilst there is a 20% difference between that of the human and the chicken. Suggest how these values would be interpreted to propose the evolutionary relationships between the three species.

[1]

Examiner Only	
Marks	Remark

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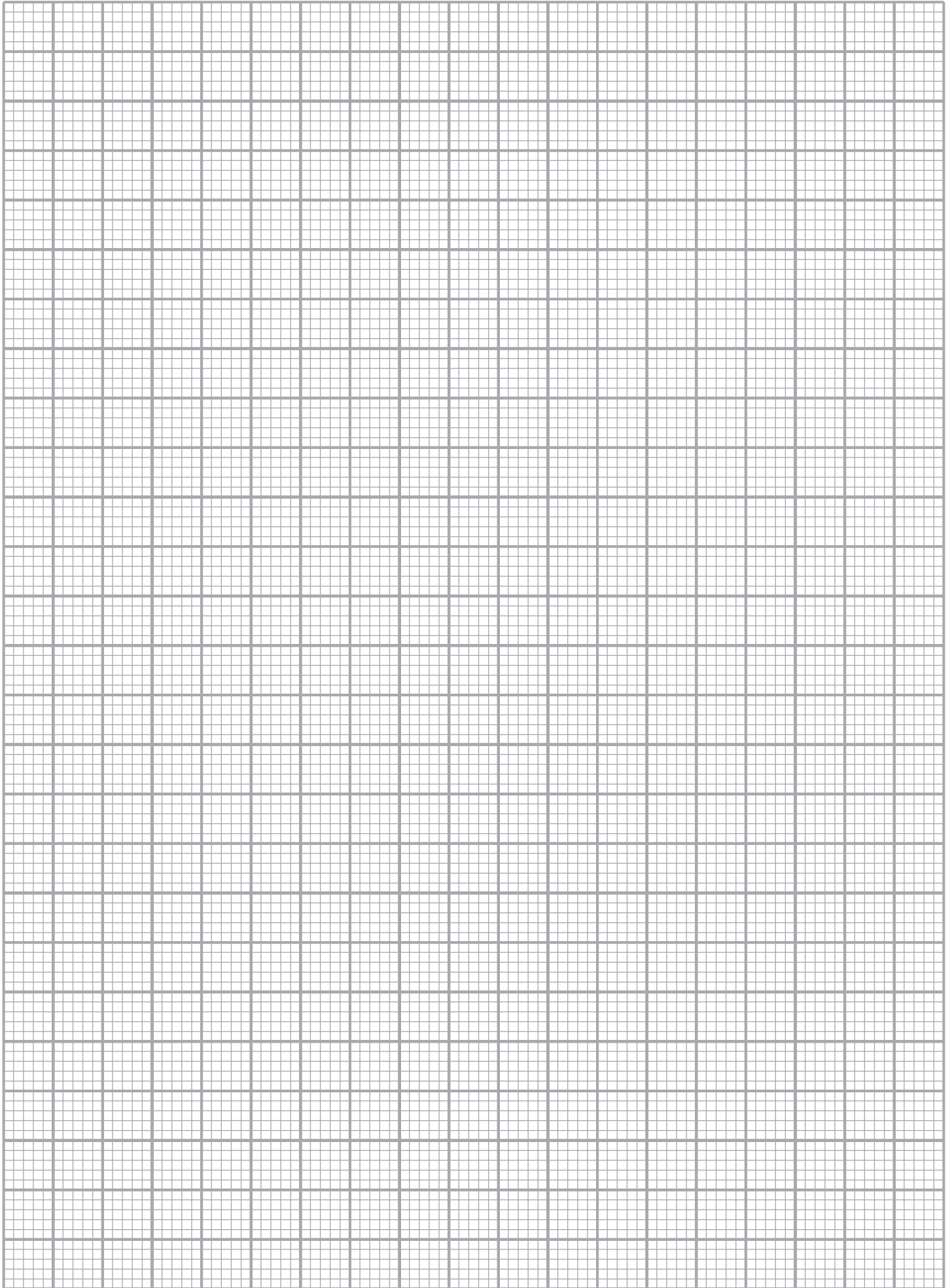
The results are shown in the table below.

Distance (d) of hairdryer from shoot/cm	Wind strength (1/d)/arbitrary units	Rate of bubble movement /mm min ⁻¹	
		Cool setting on hairdryer	Hot setting on hairdryer
11	0.09	5.2	3.8
14	0.07	4.1	4.9
20	0.05	3.1	6.2
25	0.04	2.4	5.1
50	0.02	1.0	2.3

- Note:** You do not need to include the caption on the graph. [4]

-
-
-
-
-
-
-
- [3]

Examiner Only	
Marks	Remark



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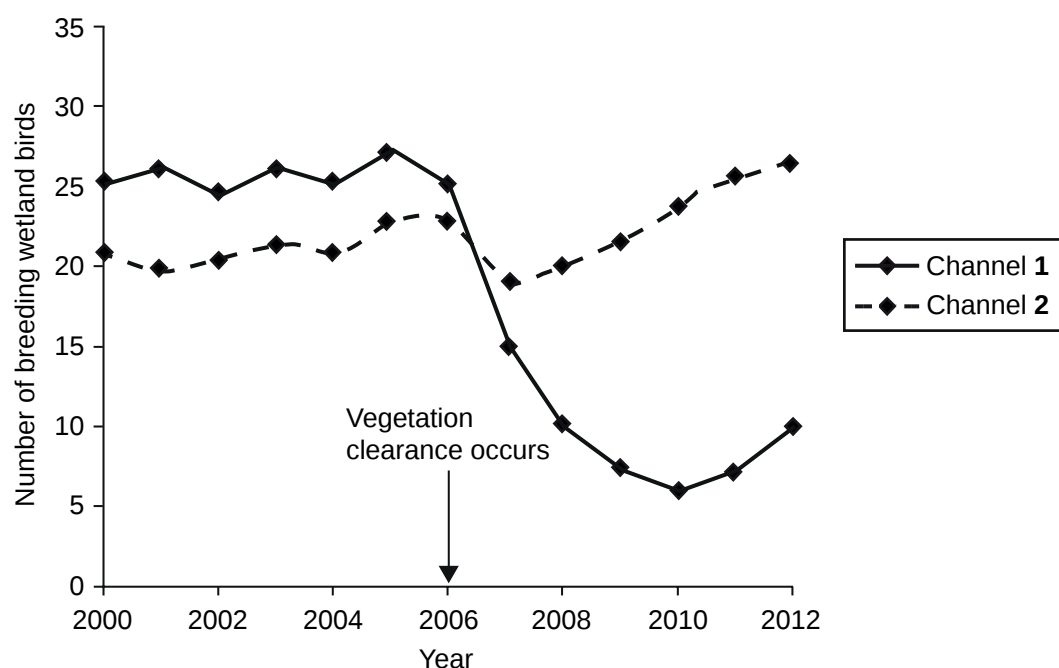
(Questions continue overleaf)

- 8 Drainage channels are important in preventing excessive waterlogging and flooding of low-lying farmland. Left undisturbed, they become overgrown with plants and function less effectively. However, such overgrown drainage channels form important wildlife habitats.

The sides of two overgrown drainage channels were cleared of vegetation using two different strategies:

- Channel 1 had both sides cleared
- Channel 2 had only one side cleared.

The total number of breeding wetland birds at each channel was surveyed for a number of years before and after clearance, which occurred in 2006.



- (a) Describe the trends in bird numbers for both channels from 2000 to 2012.

[3]

Examiner Only	
Marks	Remark

Examiner Only	
Marks	Remark

Examiner Only	
Marks	Remark

[illegible]

(b) Outline the sequence of events which leads to the formation of a blood clot following a minor cut to the skin.

[illegible]

Examiner Only	
Marks	Remark

Extra lined page

Examiner Only	
Marks	Remark

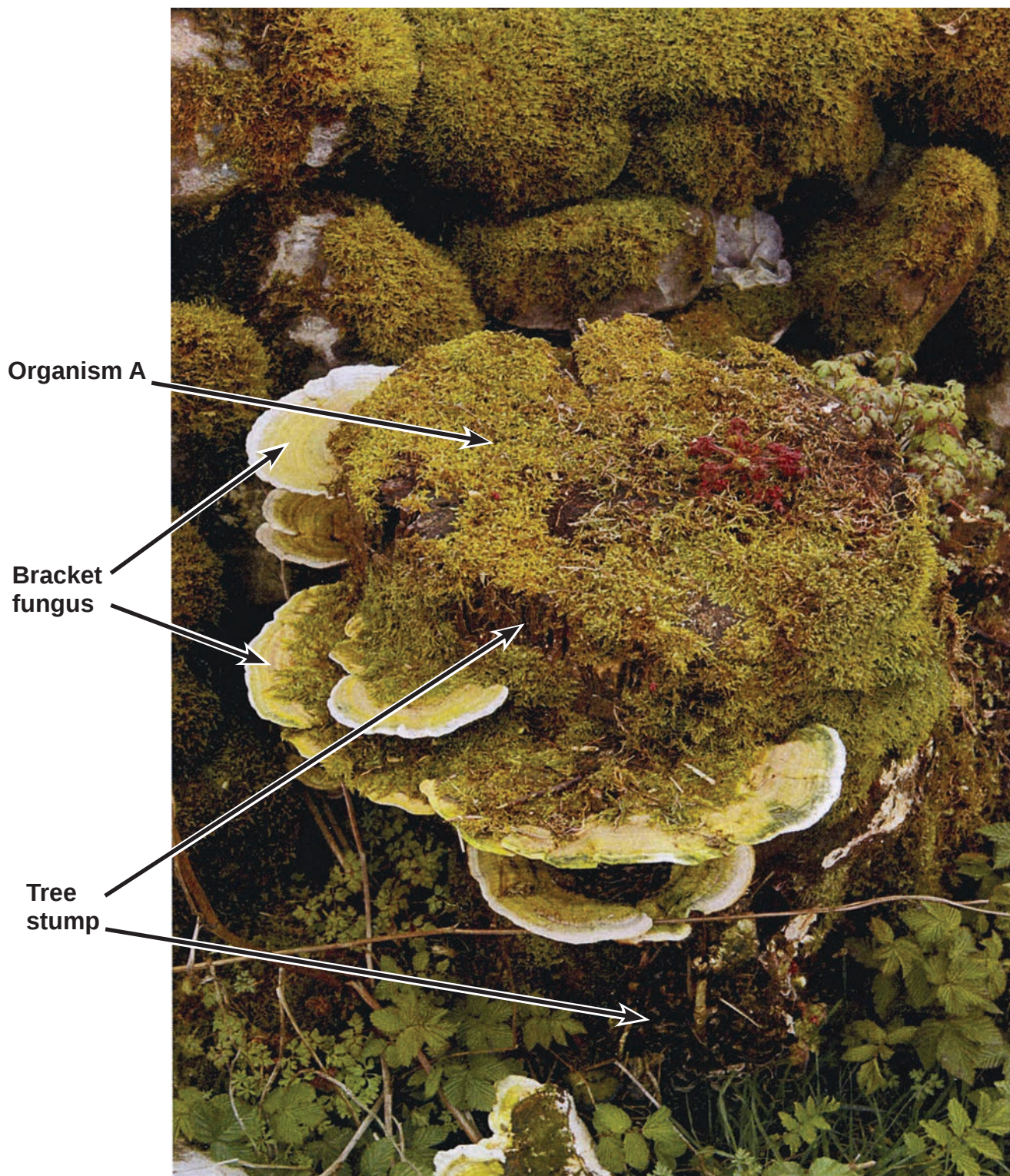
THIS IS THE END OF THE QUESTION PAPER

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GCE Biology Advanced Subsidiary (AS)

Assessment Unit AS 2
Organisms and Biodiversity
Summer 2014

Photograph 2.5 (for use with Question 5)



Source: Chief Examiner