



Rewarding Learning

ADVANCED SUBSIDIARY (AS)
General Certificate of Education
2017

Centre Number

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Candidate Number

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Biology

Assessment Unit AS 2

assessing

Organisms and Biodiversity

**[SBY21]**

SBY21

TUESDAY 6 JUNE, 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.

You must answer the questions in the spaces provided.

Do not write outside the boxed area on each page or on blank pages.

Complete in black ink only. **Do not write with a gel pen.**

Answer **all eight** questions.

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.

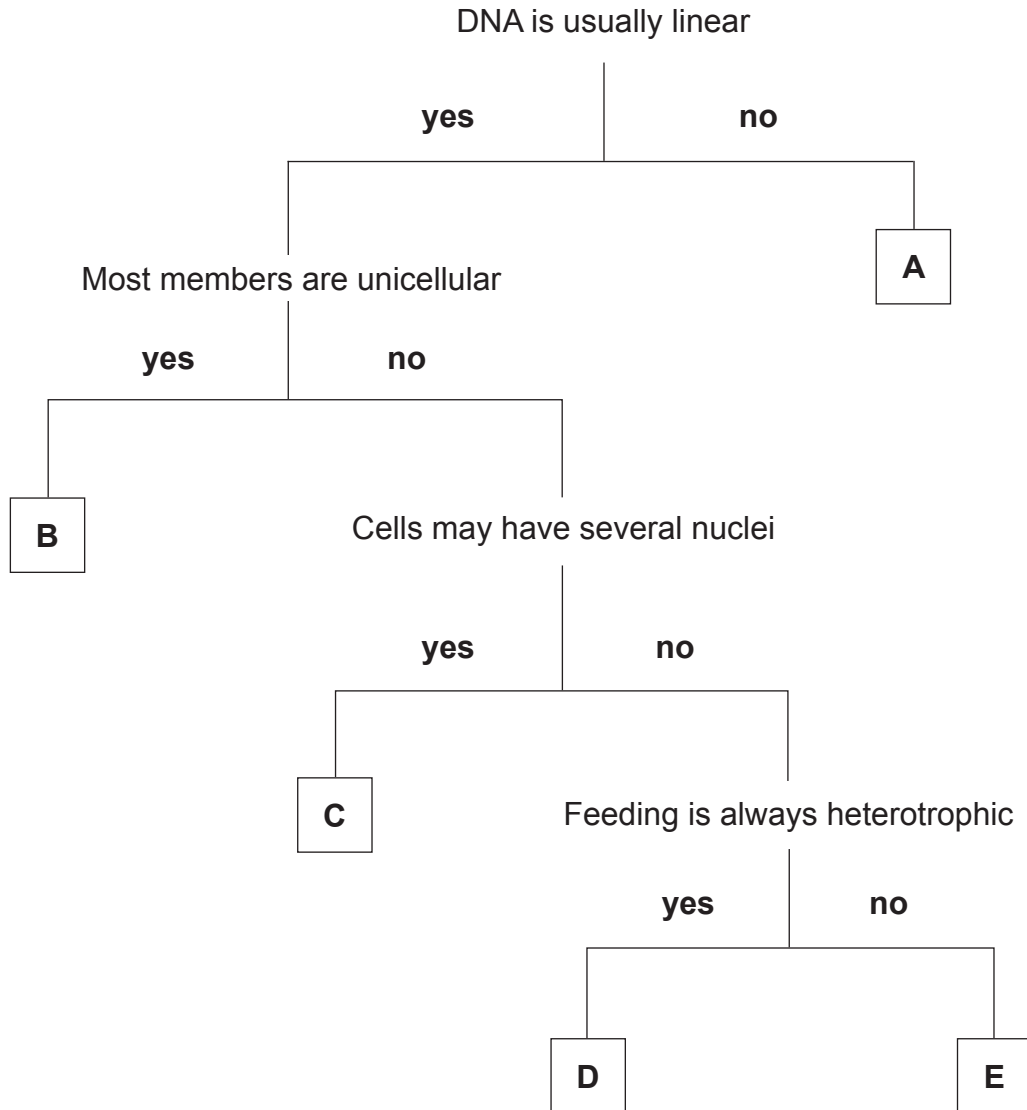
You are expected to answer Section B in continuous prose.

Quality of written communication will be assessed in Section B.



Section A

- 1 (a) Using the key below, identify the five kingdoms of living organisms labelled **A–E**.



A _____

B _____

C _____

D _____

E _____

[5]



(b) The largest taxonomic rank shown in the classification system in (a) is kingdom.

In another classification system, two or more kingdoms may form part of a larger taxonomic rank.

Identify this larger taxonomic rank, by completing the list below.

Species

Genus

Family

Order

Class

Phylum

Kingdom

[1]



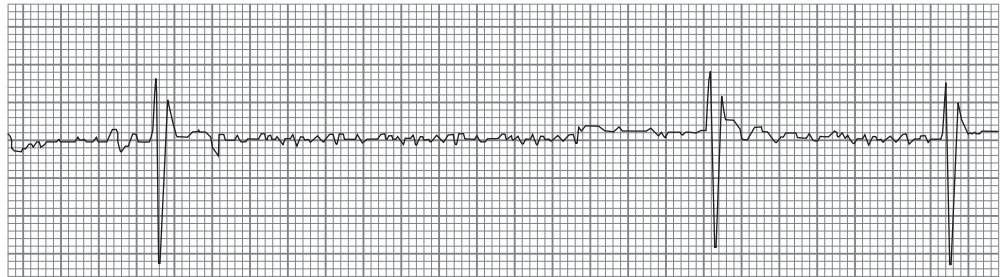
(b) Sick Sinus Syndrome (SSS) is a condition where the SAN malfunctions. The ECGs below are from a healthy individual and an individual with SSS.

ECG from a healthy person



© Science Source / Science Photo Library

ECG from an individual with SSS



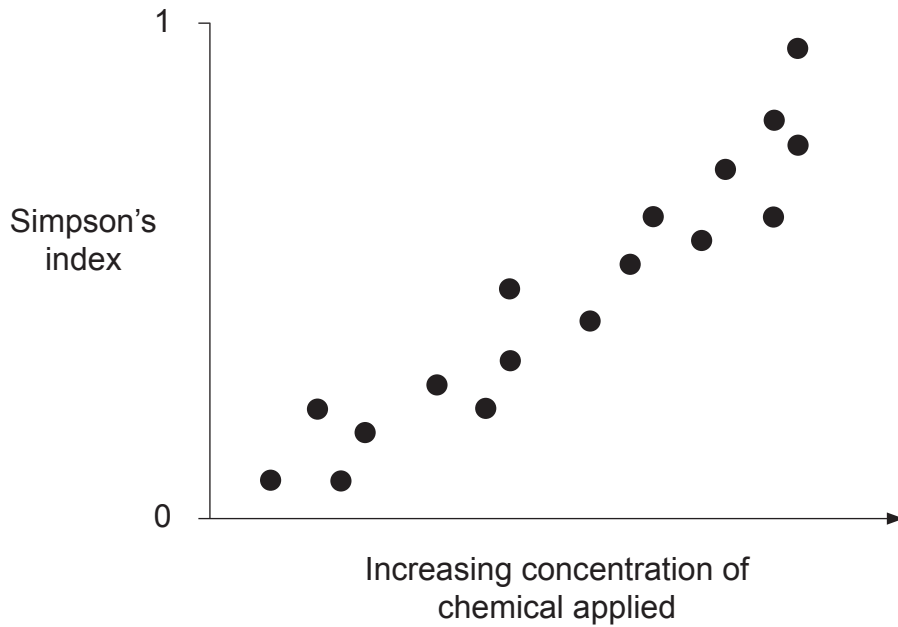
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Symptoms of this condition include tiredness and fainting. Using the information in the ECGs, suggest a reason for these symptoms.

[1]



- 3 Many farmers apply chemicals to their fields to kill weeds. An investigation was carried out into the effect of one of these chemicals on biodiversity. The results are summarised in the graph below.
(Simpson's index is a measure of biodiversity.)



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(a) Describe and explain the relationship shown in the graph.

Description

Explanation

[4]

(b) Government regulations are in place to ensure that farmers manage their hedgerows in a way that promotes biodiversity. One such regulation states that hedgerows should only be cut at certain times of the year.

Suggest when farmers should cut hedgerows and explain how this would promote biodiversity.

[2]

[Turn over



- 4 (a) Breathing in mammals depends on changes in pressure within the thoracic (chest) cavity.

Explain the mechanism of inspiration in mammals.

[3]





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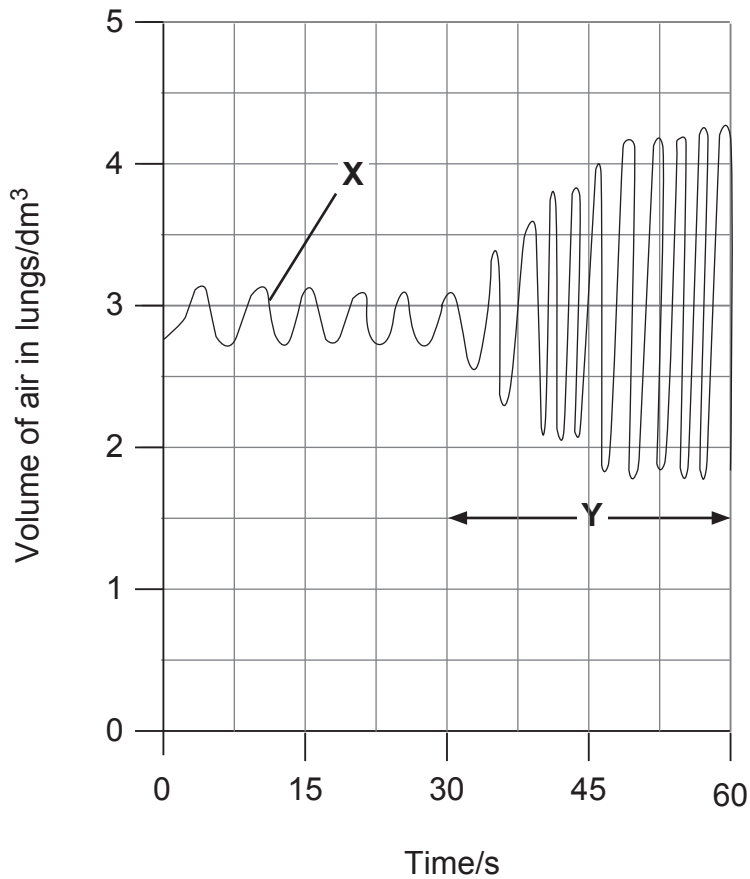
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[Turn over



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(b) The volume of air in the lungs of an individual over a one-minute period is shown in the graph below.



© CCEA

(i) Name the process taking place at X.

[1]

(ii) Describe **two** ways in which the breathing changes after 30 seconds (the period labelled Y).

1. _____

2. _____

[2]



(iii) Suggest an explanation for **one** of these differences.

[2]

[Turn over



- (c) The breathing rates of five people were monitored over a five-week period, as shown in the table below.

Individual	Average breathing rate/breaths minute ⁻¹				
	Week 1	Week 2	Week 3	Week 4	Week 5
A	14	13	15	12	13
B	11	14	12	13	12
C	19	19	20	21	22
D	13	10	14	12	12
E	12	11	13	12	11

© CCEA

- (i) Which individual's average breathing rate showed the largest range during the five-week period?

[1]





Individual **C** suffers from emphysema.

(ii) Using the information provided, describe fully and explain the data shown for **C**.

[4]

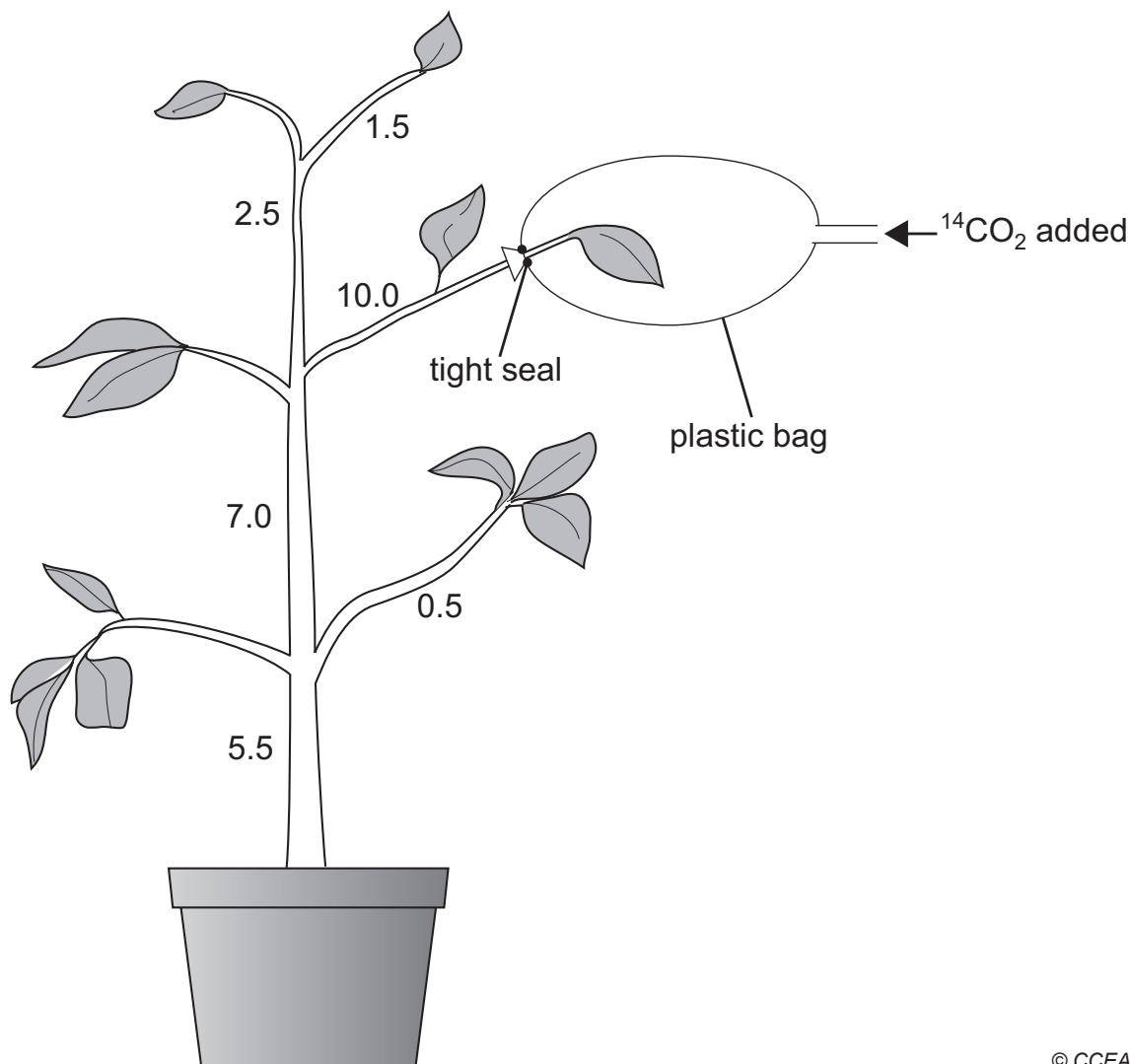
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- 5 A leaf on a photosynthesising plant was supplied with radioactive carbon dioxide ($^{14}\text{CO}_2$). The numbers on the diagram below show relative levels of radioactivity in the plant after a period of time.



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- (a) (i) Name the tissue in the stem where most radioactivity would be detected.

[1]

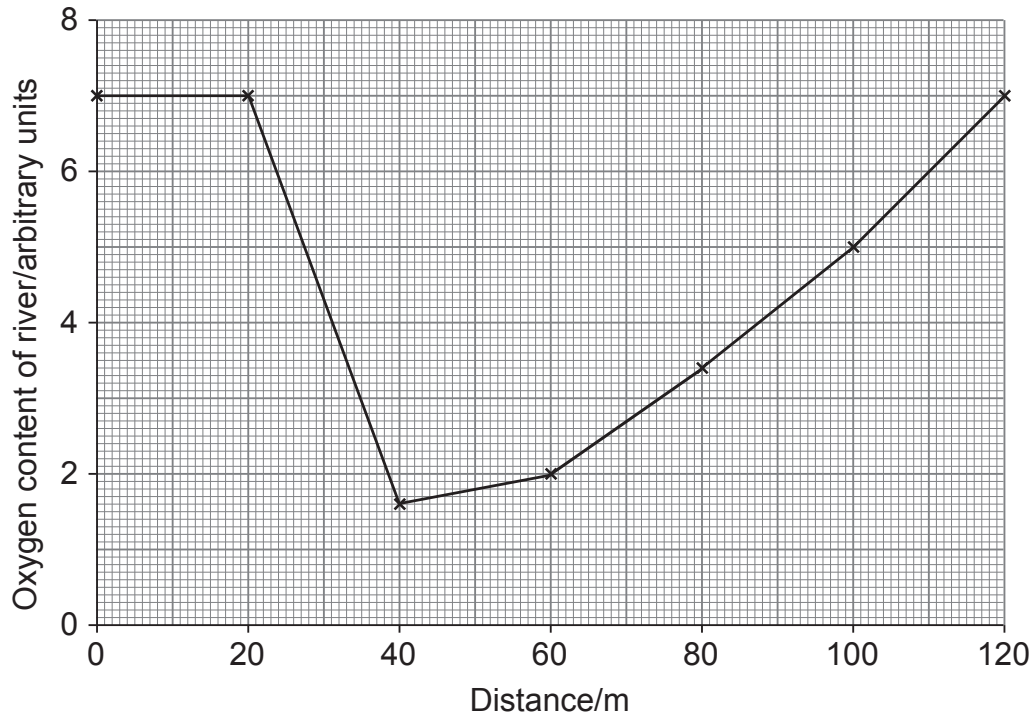
- (ii) Name the organic substance which contains most of the radioactivity in the stem.

[1]



- 6 It was suspected that a pollution incident involving slurry had occurred in a local river.

Oxygen content of the water in the river was measured, both upstream and downstream from the suspected slurry leak. Samples were taken at seven points along the river and the results are shown in the graph below.



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- (a) (i) Draw an arrow on the x-axis to indicate the point at which slurry is most likely to have entered the river.

[1]



(ii) Suggest a reason for this change.

[1]

(iii) Suggest how the investigation could be improved in order to determine more precisely the site of the slurry leak.

[1]



(c) Waterways can also be polluted by fertiliser run-off.
The effects of fertiliser run-off and pollution by slurry are different in some ways.
Suggest and explain **two** of these differences.

[4]

[Turn over

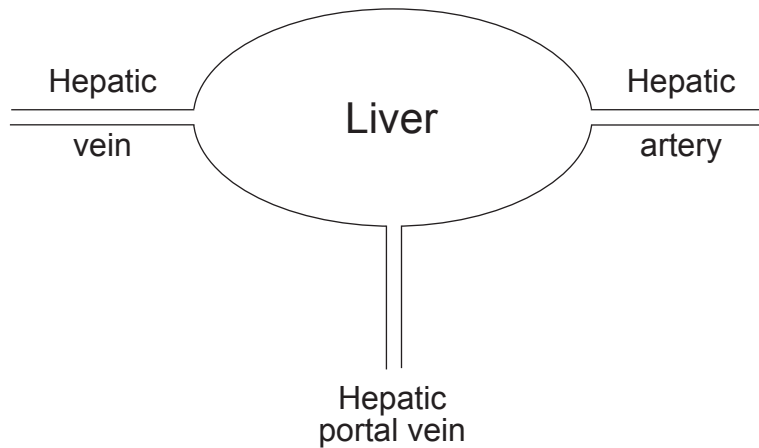


7 (a) Plasma is the liquid part of the blood and transports carbon dioxide, urea, products of digestion, heat, prothrombin, fibrinogen and clotting factors.

(i) Exchange between the blood and the body cells takes place via capillaries, which have very thin walls. Suggest **one** other way in which the capillary system is adapted for exchange.

[1]

The diagram below shows the major blood vessels which carry blood to and from the liver.



(ii) Suggest and explain **one** difference between the plasma in the hepatic vein and the plasma in the hepatic artery.

[2]



(b) (i) People suffering from the condition haemophilia are not able to produce Factor VIII. Explain fully why the meshwork which traps blood cells to form a clot cannot be produced in haemophilia sufferers.

[2]

(ii) As haemophilia sufferers cannot form this meshwork, suggest why they should seek urgent medical attention if they cut themselves.

[1]

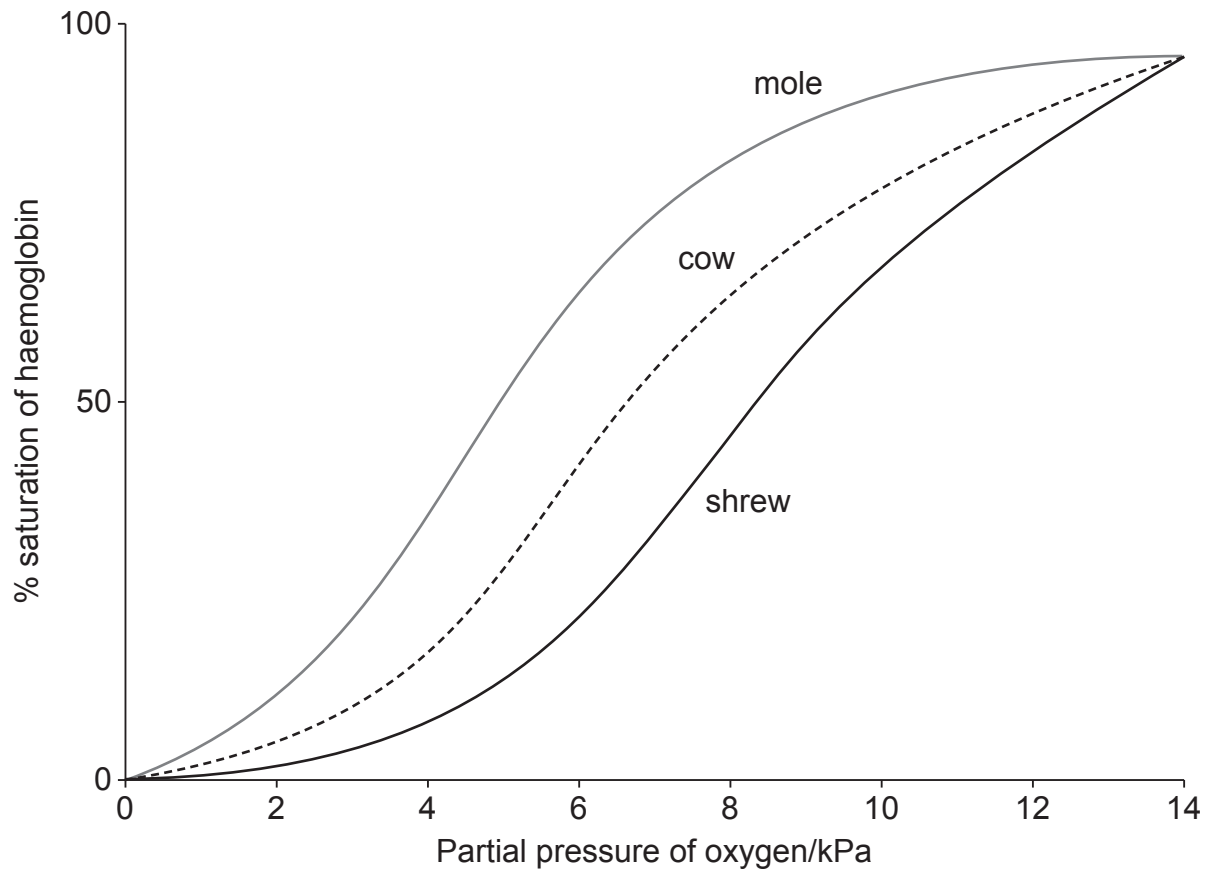
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(c) Red blood cells contain haemoglobin.

The graph below shows the oxygen dissociation curves for the haemoglobin of three mammals common in the UK.

The shrew is a small mammal with a higher metabolic rate than many larger mammals. The mole lives in narrow burrows underground.



(i) Suggest why the oxygen dissociation curve for the mole haemoglobin is to the left of those for the cow and the shrew.

[2]

(ii) Explain the difference between the oxygen dissociation curves for shrew and cow haemoglobin.

[3]

[Turn over



Section B

Quality of written communication will be assessed in this section.

- 8** Marram grass (*Ammophila arenaria*) is a xerophytic species found in the sand dunes at Murlough Nature Reserve in Northern Ireland. *A. arenaria* is most abundant in the dunes closest to the shore, where the soil has very poor water retention.

The European white waterlily (*Nymphae alba*) is a hydrophytic plant which can be found in ponds throughout the Mourne Mountains.

- (a) Using the information above, explain **two** leaf adaptations expected to be found in *A. arenaria* and **one** leaf adaptation expected to be found in *N. alba*. [6]
- (b) Describe and explain how environmental factors affect the rate of transpiration in a mesophytic (typical) plant. [9]

-
- (a) Using the information above, explain **two** leaf adaptations expected to be found in *A. arenaria* and **one** leaf adaptation expected to be found in *N. alba*.



(b) Describe and explain how environmental factors affect the rate of transpiration in a mesophytic (typical) plant.



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For Examiner's use only	
Question Number	Marks
1	
2	
3	
4	
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7	
8	

Total Marks	
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Examiner Number

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