

ADVANCED SUBSIDIARY (AS) General Certificate of Education 2017

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Biology

Assessment Unit AS 2
assessing
Organisms and Biodiversity



[AB121]

AB121

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.

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.





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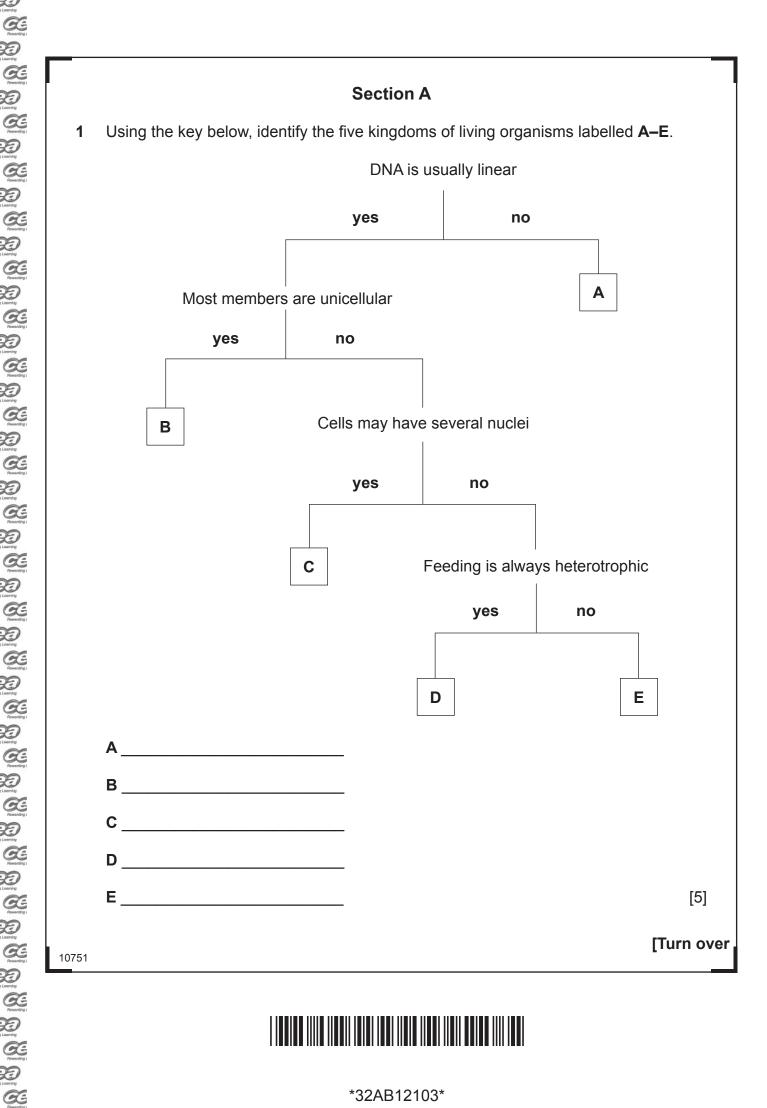
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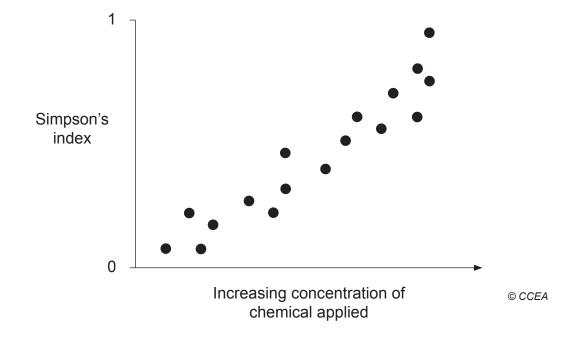






2 (a) Many farmers apply chemicals to their fields to kill weeds. An investigation was carried out into the effect of one of these chemicals on biodiversity. The results are summarised in the graph below.
(Simpson's index is a measure of biodiversity.)

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(i) State the term used for a chemical that kills weeds.

 [1]



	(ii)	Describe and explain the relationship shown in the graph.
		Description
		Explanation
		[4]
		[⁷]
(b)	hed	vernment regulations are in place to ensure that farmers manage their gerows in a way that promotes biodiversity. One such regulation states that gerows should only be cut at certain times of the year.
		gest when farmers should cut hedgerows and explain how this would note biodiversity.
		[2]
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3	(a)		c's Law states that the rate of diffusion increases if the concentration gradient igh and/or the diffusion distance is short.
		(i)	With reference to the mammalian respiratory system, describe how a high concentration gradient is maintained between the alveolus and the blood.
			[2]
		(ii)	Describe how a short diffusion distance is created between the alveolus and the blood.
			[1]
		(iii)	According to Fick's Law, a third factor contributes to an increased rate of diffusion across an exchange surface. Identify this factor and describe how it is achieved in the lungs.
			[2]
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(b)	Special cells around the alveoli secrete a substance called surfactant. Some premature babies cannot produce enough of this substance and therefore need assistance to breathe.
	State the function of surfactant and suggest, with reference to Fick's Law, how a lack of it would result in poor gas exchange in premature babies.
	[2]

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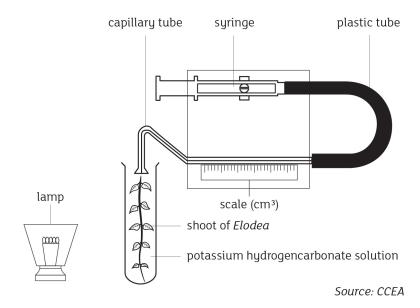
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The Audus apparatus shown below was used to measure the volume of oxygen produced by a shoot of pondweed (*Elodea*) over 15 minutes in each of three different light intensities. This data could be used to indicate the rate of photosynthesis in this aquatic plant.

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(a)	(i)	State the	function	of the	syringe	in	this	apparatus	3
۱	(u)	('')	Clate the	Idilottoli	OI LIIC	Symige		uno	apparata	J.

			[1]
 	 	 	L'.

((ii)	Describe	how the	independe	ent variable	could have	been	changed
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		[1]



				[2
	e experiment was shown in the tab		mes in each light into	ensity and the result
L	ight intensity	Volume of ox	xygen collected in 1	5 minutes/cm³
	High	10.5	10.5	9
		6	5.5	4.5
	Medium	6	0.0	1.0
	Medium Low	2	3	1.5
(i)	Low	2 rerage rate of oxyge		1.5
(i)	Low Calculate the av intensity.	2 rerage rate of oxyge	3	1.5
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(i)	Low Calculate the av intensity.	2 rerage rate of oxyge	3	1.5

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	Suggest why the volume of oxygen collected would be less than the total oxygen produced by this shoot.	
		- -
	l	[1]
	g the diagram of the apparatus provided, suggest how the accuracy of the lts could be improved.	
_		_ [1]

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(a) l	n the space below, draw a block diagram to show the tissues present oot, as shown in the photomicrograph. Label your diagram to identify	t in the
	issues.	ioui

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(h)	Describe concisely how water is transported up a stem according to the
(D)	cohesion-tension theory.
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(c) In mammals, blood is involved in both transport and defending the body against disease. Some of the white blood cells involved in defence are shown below. Complete the table by naming the three types of white blood cell shown and stating the function of each.

Diagram	Name	Function

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In the UK the peppered moth (Biston betularia) has two distinct forms, a light peppered form and a dark melanic form, as shown in the photographs below. Before the UK became industrialised, the light form was more common and the dark form was rare.



Light form



Dark form

© Photographs of Biston betularia taken by Olaf Leillinger, June 2006. Published by Colourpoint Educational "AS Biology for CCEA". Licenced under https://
creativecommons.org/licenses/by-sa/2.5/deed.en

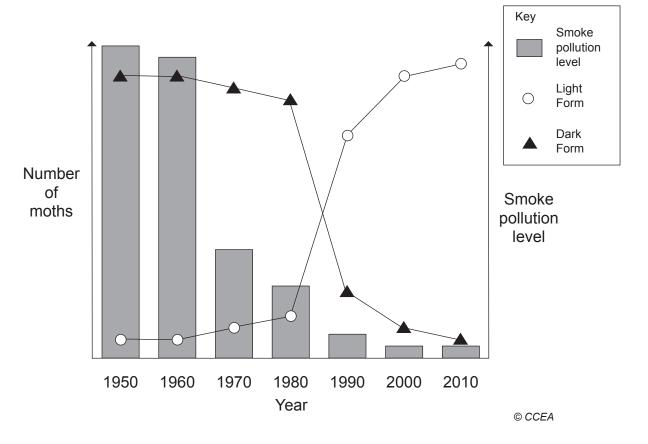
(a)	(i)	State the genus of the peppered moth.
		[1]
	(ii)	Despite the different appearance, the two forms are classified as the same species. Define the term 'species'.
		[1]

[Turn over



(b) During the day, the moths rest on lichen-covered tree branches and trunks where they are vulnerable to predation by a range of birds.

As a result of the Industrial Revolution, smoke pollution increased significantly in the UK, and tree trunks in many areas became blackened by soot. In the 1950s controls were put in place to reduce air pollution. The graph below shows pollution levels and the relative number of each form of moth between 1950 and 2010.



(i) Estimates of the numbers of the two forms were made by sampling the moths found on tree trunks. Suggest how this may result in an underestimation of numbers.

		F.4.5

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(ii)	Name the type of selection demonstrated by the data and explain the change in numbers of the light form from 1970 to 2010.	
	Type of selection	
	Explanation	_
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twig. Suggest how the catery Peppered motion caterpillar	Twig
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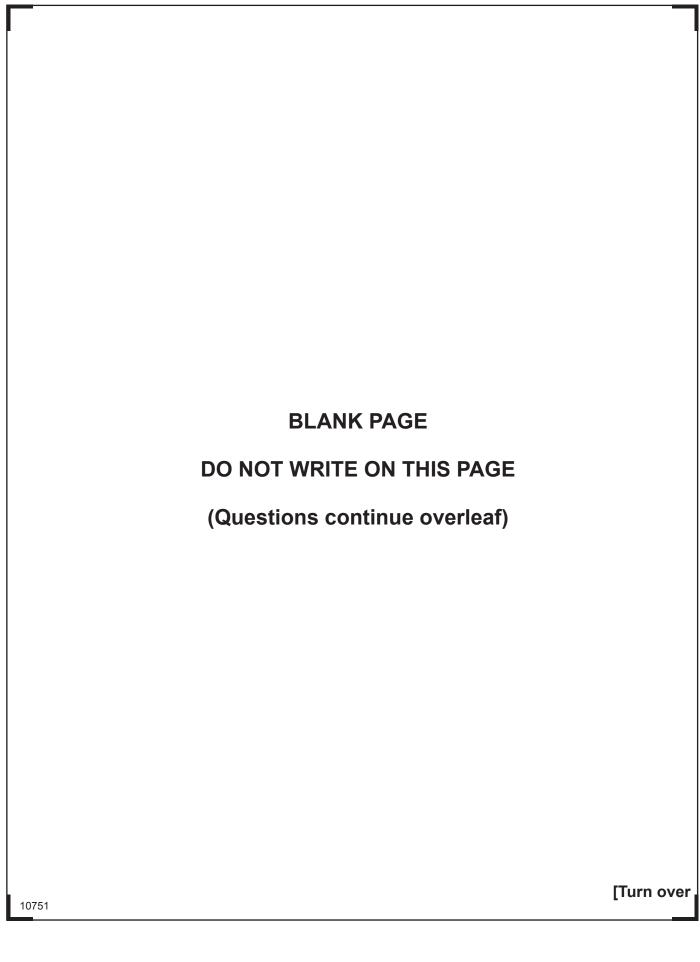
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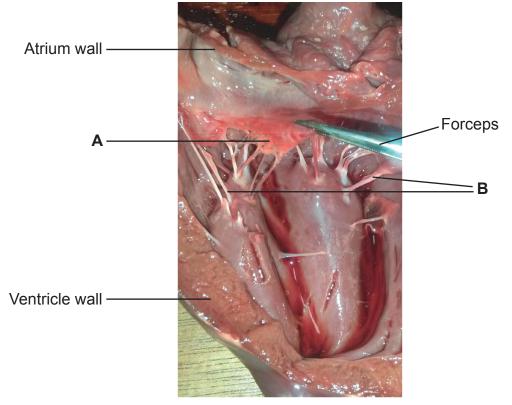


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7 The heart contains several structures which are necessary for its function of pumping blood in one direction. The photograph below shows the left side of the heart when dissected.



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(a)	(i)	Name	the	structures	labelled	A and B.
-----	-----	------	-----	------------	----------	----------

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(ii) Explain how structures A and B ensure that blood flows through the heart in one direction.

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	Explain the difference in thickness of the atrium and ventricle walls as shown in the photograph.
-	
-	[2]
	Semi-lunar valves also have a role in maintaining the blood flow through the neart. Explain what causes these valves to open during ventricular systole.
-	

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(b)	The	e sinoatrial node (SAN) is often referred to as the pacemaker of the heart.
	(i)	State precisely the location of the SAN in the heart.
	(ii)	Describe how a wave of excitation, which originates in the SAN, eventually results in ventricular systole.
		[4]

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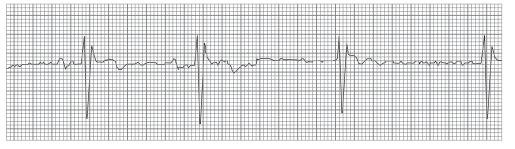
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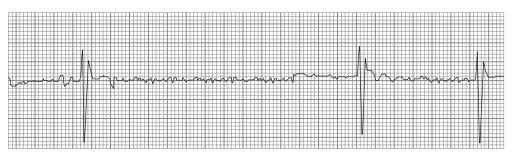
(c) Sick Sinus Syndrome (SSS) is a condition where the SAN malfunctions. The ECGs below are from a healthy individual and an individual with SSS.

ECG from a healthy person



© Science Source / Science Photo Library

ECG from an individual with SSS



© Science Source / Science Photo Library

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

[Turn over



Section B

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Quality of written communication is awarded a maximum of 2 marks in this section.

- Marram grass (Ammophila arenaria) is a plant species found in the sand dune system at Murlough Nature Reserve in County Down. After sampling the sand dunes, A. arenaria was found to be most abundant in the dunes closest to the shore, where water retention by the soil is very poor.
 - (a) Describe how the abundance of A. arenaria could be sampled along the sand dune system. [4]
 - **(b)** Describe and explain the environmental factors that affect the rate of transpiration in a plant and suggest two adaptations the leaves of A. arenaria may have to survive in a sand dune habitat. [9]

Qua	ality of written communication	[2]
(a)	Describe how the abundance of <i>A. arenaria</i> could be sampled along the sand dune system.	

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in a plant and suggest two adaptations the leaves of <i>A. arenaria</i> may have to survive in a sand dune habitat.

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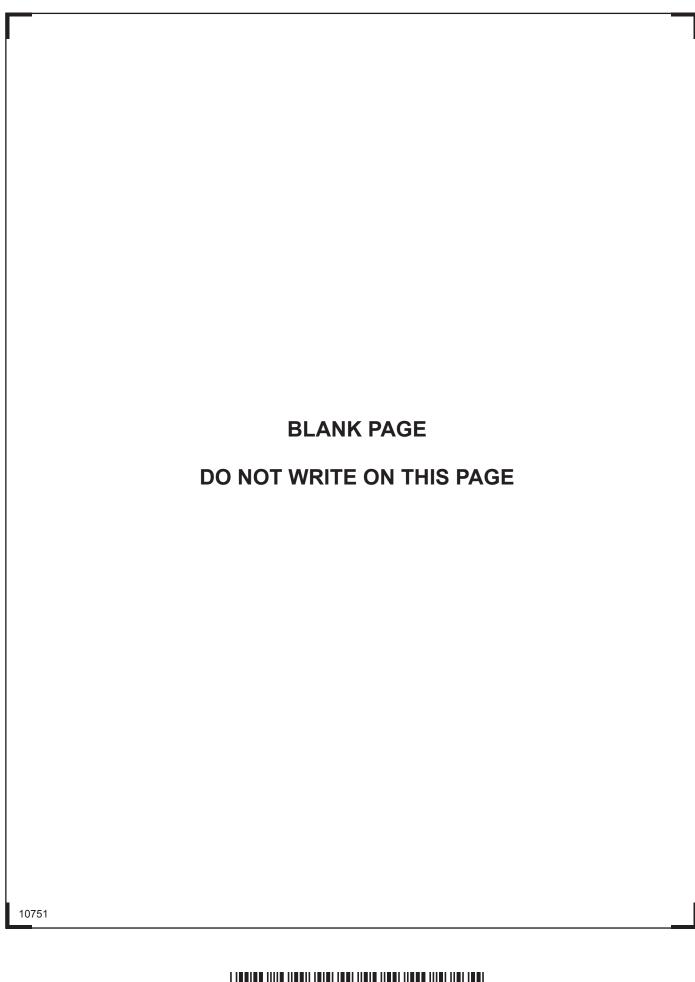
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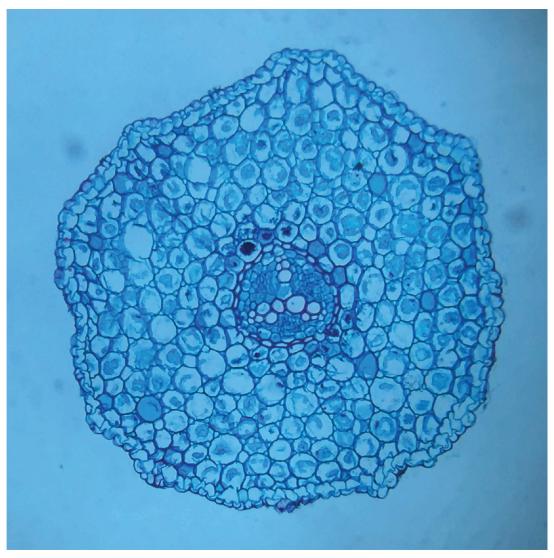


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GCE Biology Advanced Subsidiary (AS) Assessment Unit AS2 Organisms and Biodiversity Summer 2017

Photograph 2.5 (for use with Question 5)



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