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General Certificate of Secondary Education 2017

Biology

Unit 1

Higher Tier



[GBY12]

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FRIDAY 9 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.

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 twelve questions.

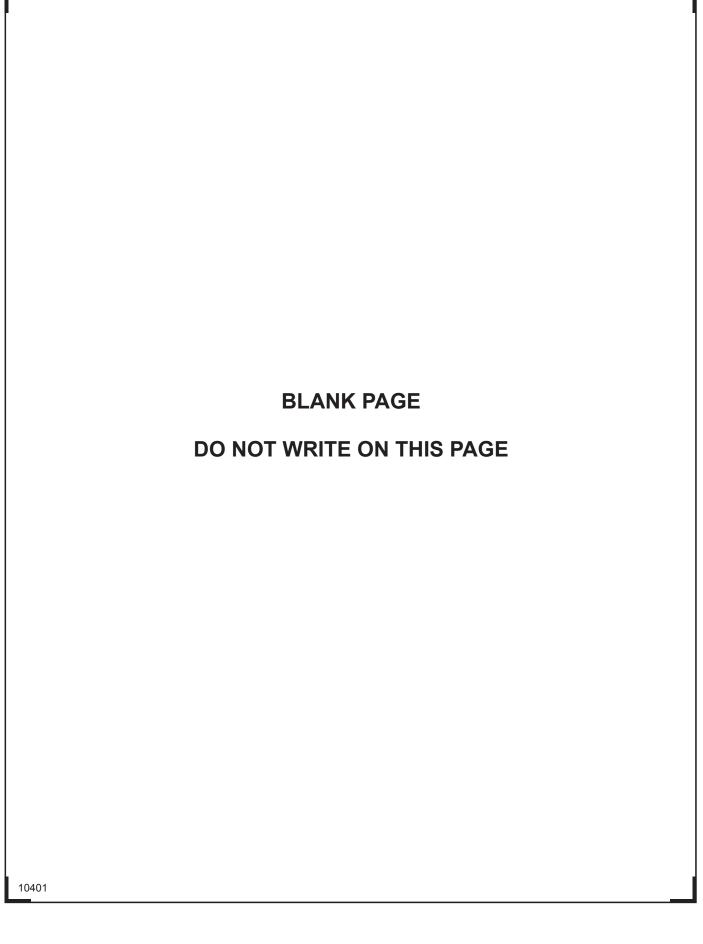
INFORMATION FOR CANDIDATES

The total mark for this paper is 100.

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

Quality of written communication will be assessed in Questions 4 and 11(a).





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1 The table gives information about food molecules.

Complete the table.

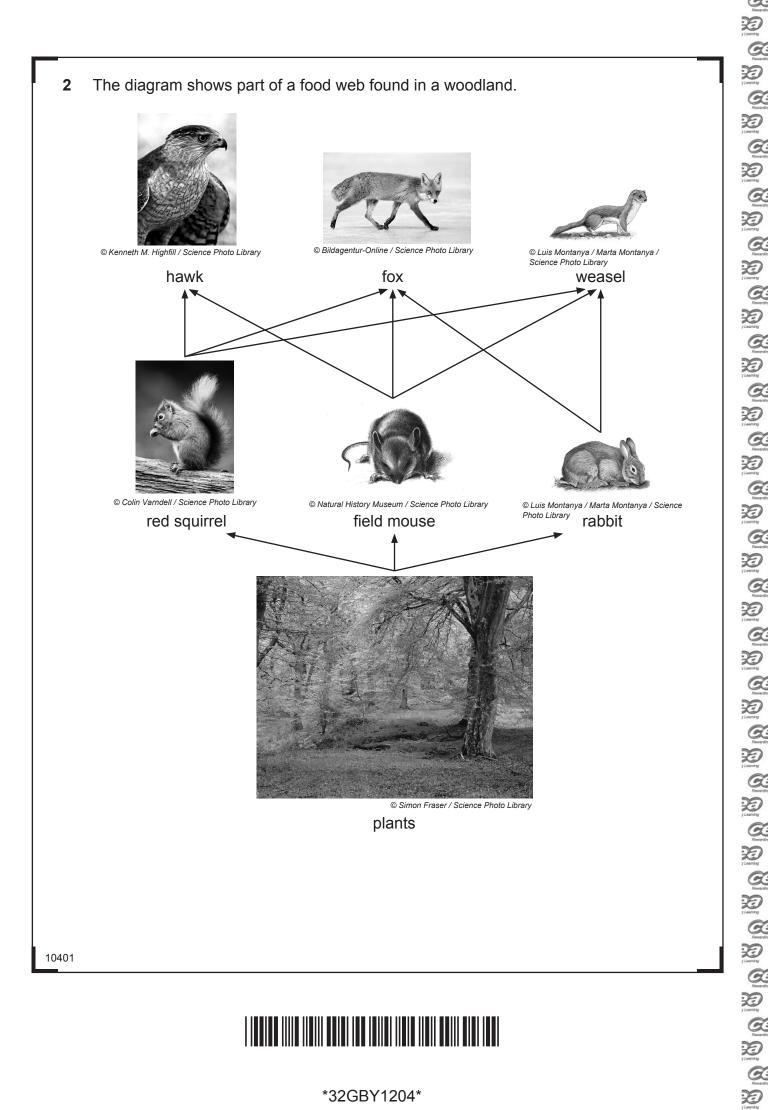
Food molecules	Smaller molecules they are made from	Main function in the body
Carbohydrates		
Fats		Energy store
Proteins		Growth and repair

[4]

[Turn over

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(a) D	Describe the role of plants in this food web.	
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In this	s woodland, disease killed many red squirrels.	
(D) =	xplain how this would affect the number of field mice.	
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3 The photograph shows how a plant responds to light from one direction.



© Martin Shields / Science Photo Library

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Look at the photograph.

(a)	Name	the	plant's	response	to	light.
-----	------	-----	---------	----------	----	--------

(b) The hormone auxin causes the plant to bend.

Explain h	iow.
-----------	------



(c)	Suggest why this response may benefit the plant.	
		[2]
		_
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4 A class of students set up an investigation into the effect of amylase and lipase enzymes on starch solution.

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They set up two test tubes each containing 5 cm³ of starch solution.

They added 2 cm³ of amylase solution to tube **A**.

They added 2 cm³ of lipase solution to tube **B**.

The students then placed tubes **A** and **B** in a water bath at 35 °C for 30 minutes.

After 30 minutes the students added 5 drops of iodine to each tube.

The colour of the solution in each tube was recorded.

The table shows their results.

Tube	Enzyme present	Colour of starch solution after 30 minutes
Α	amylase	yellow/brown
В	lipase	blue/black



	Evolain the regulte for amylese and linese
	Explain the results for amylase and lipase.
l	Jse your knowledge of enzyme structure and action to support your answer.
	see your knowledge or enzyme structure and detion to support your answer.
	n this question you will be assessed on your written communication skills
	ncluding the use of specialist scientific terms.
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	[Ті



5 The table shows the mass of some gases released into the atmosphere between 2009 and 2013 in the UK.

Gas	N	Mass of gas i	eleased/thou	usand tonne	S
Gas	2009	2010	2011	2012	2013
Sulfur dioxide	1042	1040	1015	972	894
Nitrogen oxides	563	581	527	563	479

(a) Give one similarity and one difference in the trend in mass of sulfur dioxide

Statistics from Office for National Statistics database "Acid Rain Precursor Emissions, United Kingdom" 1990 - 2013. Previous revision 05/07/16. © Crown Copyright - Contains public sector information licensed under the Open Government Licence v3.0

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and nitrogen oxides between 2009 and 2013.	
Similarity	
Difference	
	 _ [2]
Factories and power stations release large masses of sulfur dioxide into the atmosphere.	
Describe how this sulfur dioxide is produced.	
	 [2]

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(b)



Describe how sulfur dioxide in the atmosphere can lead to acid rain.	
Describe and explain how acid rain affects the biodiversity of a forest eco	osystem.
	[0]
	[-]
	Describe and explain how acid rain affects the biodiversity of a forest eco



6	Classification is used to identify different species of organisms.
	(a) What is a species?
	[2]
	(b) This key can be used to classify organisms into five kingdoms.
	Organisms
	Yes Nucleus present No
	Yes Multicellular No Kingdom A
	Yes Cell wall present No Kingdom B
	Yes Saprophytic No Kingdom C
	Kingdom D Plant kingdom
	Use the key to identify the kingdoms A, B, C and D.
	Kingdom A
	Kingdom B
	Kingdom C
	Kingdom D [4]
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7 (a) An experiment was set up to investigate the growth of two crops of a plant of the same species under different conditions.

Artificial fertiliser was applied to one and manure to the other.

The table shows the results.

Time/weeke	Average mass of plants/g		
Time/weeks	Artificial fertiliser	Manure	
0	0	0	
4	110	50	
8	320	160	
12	450	340	
16	470	450	

(i) Complete the graph by plotting the results for manure.



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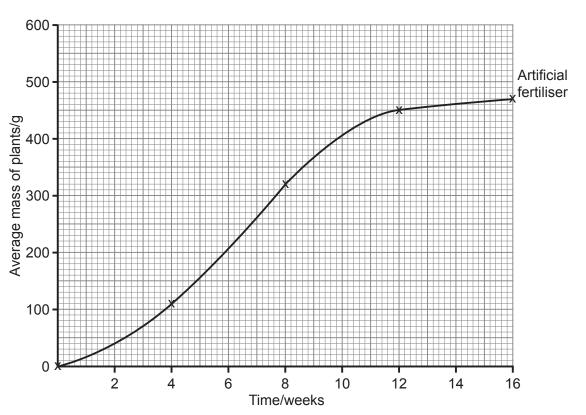
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	The	e plants must reach an average mass of 4	00g before they can be ha	rvested.
	(ii)	How long does it take the plants to reach	this mass?	
		Artificial fertiliser	_ weeks	[1]
		Manure	weeks	[1]
	(iii)	Explain why the plants grow slower when	n manure is applied.	
				[2]
(b) Sug	ggest why adding manure is beneficial to t	he soil.	
				[1]
(c) Giv	e two advantages to the grower of using a	artificial fertiliser.	
				[2]
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(d)	The	e overuse of fertilisers may result in mineral enrichment of lakes.	
	(i)	Describe how the minerals in the fertilisers reach the lakes.	
			[
	(ii)	Describe and explain the effect of mineral enrichment on the living organisms in the lakes.	
			[

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	nen the blood glucose concentration rises rmal concentration.	the particleas helps return it to its
(a)	Describe the role of the pancreas in low	vering the blood glucose concentration.
		[2
(b)	Describe how the liver helps lower the b	lood glucose concentration.
		[3
(c)	Name the hormone which helps correct falls too low.	the blood glucose concentration when it
		[1



- 9 Doctors use Body Mass Index (BMI) to check if a person has a healthy weight.
 - (a) Complete the equation for the calculation of BMI by writing in the box.

[2]

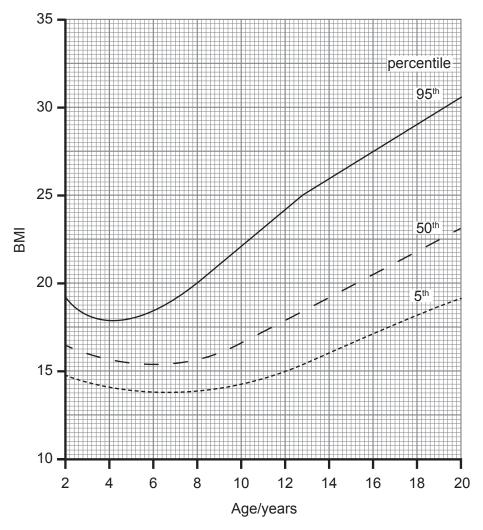
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(b) The graph shows the range of BMI values for boys aged 2 years to 20 years in a population.

The 50th percentile shows the average BMI for the population.

Boys with a BMI on or above the 95th percentile are described as obese.



© CDC - Graph data developed by the National Center for Health Statistics in collaboration with the National Center for Chronic Disease Prevention and Health https://www.cdc.gov/growthcharts/





		[
(ii)	Describe the trend in the BMI for boys between 2 and 20 years.	
		[
(iii)	From what age would a boy with a BMI of 20 or above be described as obese?	
		[
(iv)	Describe how an energy imbalance can lead to obesity.	
		[
(v)	Explain why obesity is a problem to both the individual and to society. Individual	
	Society	[
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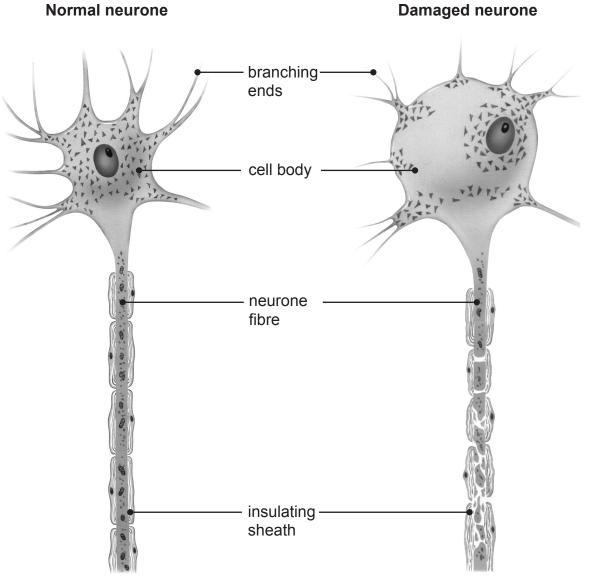
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10 The	ima	age shows a junction between two neurones A and B .
Neurone	Α-	Neurone B
		© Sebastian Kaulitzki / Science Photo Library
(a)	(i)	Name this junction.
		[1]
	(ii)	Describe how a nerve impulse travels from neurone A to neurone B .
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(b) The diagram shows a normal neurone and a damaged neurone from a person suffering from multiple sclerosis.



© JFalcetti / iStock / Thinkstock

(i)	Describe how these neurones are adapted to make connections with
	other neurones.

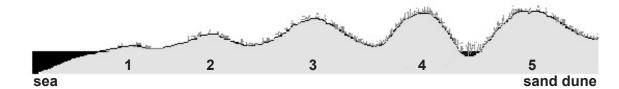
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Suggest one effect of multiple sclerosis on the function of the	
nervous system.	



11 Sand dunes are found at the top of many beaches.



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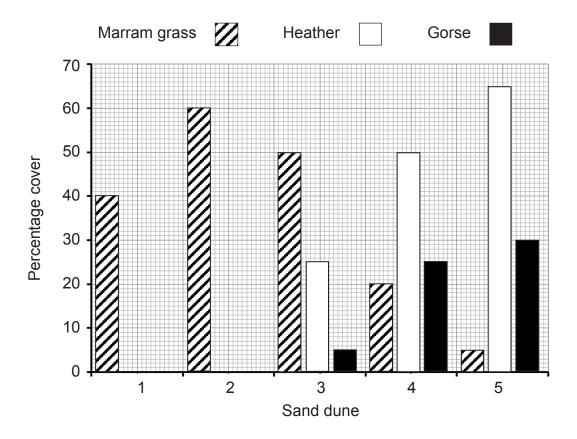
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Students carried out an investigation to measure the percentage cover of three plant species, marram grass, heather and gorse growing on five sand dunes.

The graph shows the results.





(a)	Describe the trends in the distribution of the three plant species from sand dune 1 to sand dune 5.
	Explain which of the five dunes had the most competition.
	Use evidence from the graphs to support your answer.
	In this question you will be assessed on your written communication skills, including the use of specialist scientific terms.
	<u> </u>
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	[6]
	[Turn over



(b) The students also measured some abiotic factors on each sand dune.

The table shows the results.

Sand duna	Abiotic factor/arbitrary units				
Sand dune	Soil water	Wind speed	Soil humus	Light intensity	
1	6	15	4	16	
2	7	7	5	22	
3	15	18	9	19	
4	28	12	22	18	
5	42	17	37	25	

(i) Use information from the graph and the table to suggest which of the abiotic factors affect the growth of heather and gorse.

Place a tick in the appropriate boxes.

Wind speed		Light intensity	[2]
Soil water		Soil humus	

(ii) Suggest an explanation for the change in the humus content of the soil on sand dunes 3, 4 and 5.

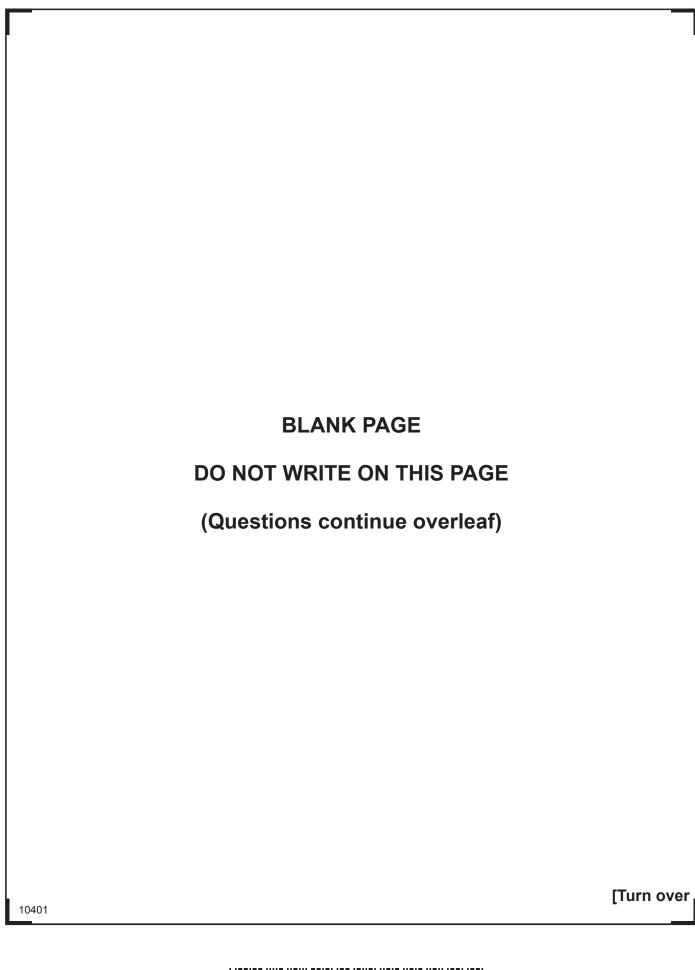
Use evidence from the graph and the table to support your answer.

•	

_ [2]

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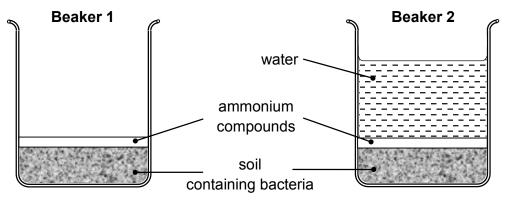
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12	(a)	Pla	nts use nitrates for growth.	
		(i)	Describe how plants absorb nitrates.	
			·	
				
			[3	
		(ii)	Describe how plants are adapted to absorb nitrates.	

(b) A student set up an experiment to investigate the effect of waterlogging on some of the processes in the nitrogen cycle.

He set up two beakers as shown in the diagrams.



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[2]



The student measured the concentration of ions in each beaker at the start and after 24 hours.

The table shows the results.

Pookor	lan	Concentration of ions/arbitrary units		
Beaker	lon	at start	after 24 hours	
4	ammonium	600	550	
1	nitrates	90	140	
	ammonium	600	595	
2	nitrates	90	95	

In **beaker 1** the ammonium compounds are being converted to nitrates.

(i)	Name this process.	[4]
(ii)	Use the results for beakers 1 and 2 to describe and explain the effect of waterlogging on this process.	[1]
		_
		_
		 [3]

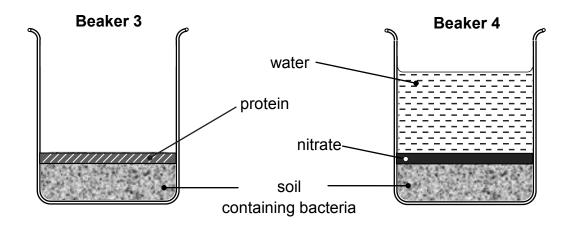
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The student set up two more beakers as shown in the diagrams.



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The student measured the concentration of ions in each of these beakers at the start and after 24 hours.

The table shows the results.

Beaker	lon	Concentration of ions/arbitrary units		
Deaker	lon	at start	after 24 hours	
2	ammonium	30	120	
3	nitrates	90	90	
4	ammonium	30	30	
4	nitrates	200	120	



 Explain the results for beakers 3 and 4, and name the process occur each beaker. 	rring in
Use data from the table to support your answer.	
Beaker 3	
	[3]
Beaker 4	
	
	[3]
THIS IS THE END OF THE QUESTION PAPER	

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Question Number	Marks	
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Total Marks

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