

Please write clearly in	block capitals.		
Centre number		Candidate number	
Surname			
Forename(s)			
Candidate signature			

GCSE BIOLOGY

H

Higher Tier Paper 2H

Monday 11 June 2018

Morning

Time allowed: 1 hour 45 minutes

Materials

For this paper you must have:

- a ruler
- a scientific calculator.

Instructions

- Use black ink or black ball-point pen.
- Fill in the boxes at the top of this page.
- Answer all questions in the spaces provided.
- Do all rough work in this book. Cross through any work you do not want to be marked.
- In all calculations, show clearly how you work out your answer.

Information

- There are 100 marks available on this paper.
- The marks for questions are shown in brackets.
- You are expected to use a calculator where appropriate.
- You are reminded of the need for good English and clear presentation in your answers.

For Examiner's Use		
Question	Mark	
1		
2		
3		
4		
5		
6		
7		
8		
9		
TOTAL		



2

0 1	Many human actions are reflexes.	Do not write outside the box
01.1	Which two of the following are examples of reflex actions? [2 marks] Tick two boxes.	
	Jumping in the air to catch a ball	
	Raising a hand to protect the eyes in bright light	
	Releasing saliva when food enters the mouth	
	Running away from danger	
	Withdrawing the hand from a sharp object	
	Figure 1 shows how the size of the pupil of the human eye can change by reflex action.	
	Figure 1	
	A Pupil B	
0 1.2	Name one stimulus that would cause the pupil to change in size from A to B , as shown in Figure 1 . [1 mark]	

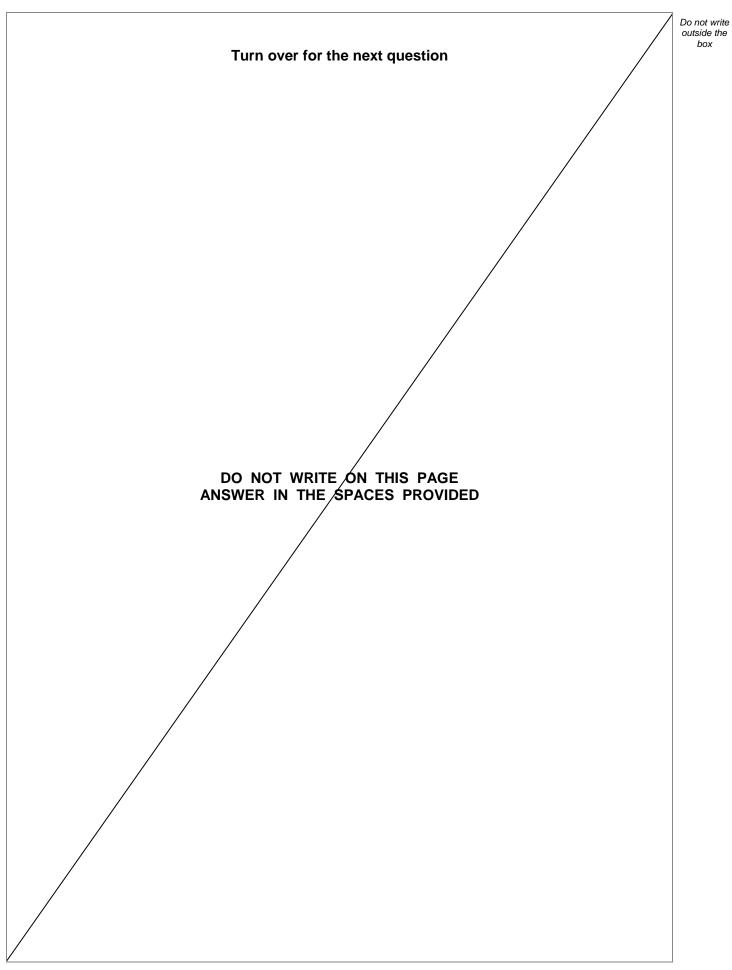


0 1.3	Structure Q causes the change in size of the pupil. Name structure Q . [1 mark]	Do not write outside the box
0 1.4	Describe how structure Q causes the change in the size of the pupil from A to B . [1 mark]	
	Question 1 continues on the next page	



0 1.5	Figure 2 shows some structures involved in the coordination of a reflex action.
	Figure 2
	Neurone A Receptor Effector Spinal cord Neurone C Neurone B
	Describe how the structures shown in Figure 2 help to coordinate a reflex action. [6 marks]





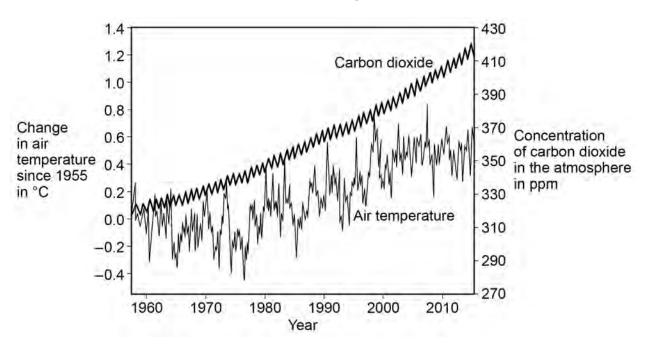


0 2

Many scientists think that global air temperature is related to the concentration of carbon dioxide in the atmosphere.

Figure 3 shows changes in global air temperature and changes in the concentration of carbon dioxide in the atmosphere.

Figure 3



0 2 . 1 Complete Table 1.

Use information from Figure 3.

[2 marks]

Choose answers from the box.

You may use each answer once, more than once or not at all.

constant	decreasing	increasing
----------	------------	------------

Table 1

	1960 – 1977	1977 – 2003	2003 – 2015
Trend in carbon dioxide concentration	Increasing		
Trend in air temperature			



	Many scientists think that an increase in carbon dioxide concentration in the atmosphere causes an increase in air temperature.	Do not write outside the box
0 2.2	How would an increase in the concentration of carbon dioxide in the atmosphere cause an increase in air temperature? [1 mark]	
0 2 . 3		
0 2 . 3	Evaluate evidence for and against the theory that an increase in the concentration of carbon dioxide in the atmosphere causes an increase in air temperature. Use data from Figure 3 and your own knowledge. [4 marks]	





		DUTTOL
	In each year, the concentration of carbon dioxide in the atmosphere is higher in the winter than in the summer.	outside bo.
0 2.4	Give one human activity that could cause the higher concentration of carbon dioxide in the winter.	
	[1 mark]	
0 2.5	Give one biological process that could cause the lower concentration of carbon dioxide in the summer.	
	[1 mark]	
0 2.6	Give two possible effects of an increase in global air temperature on living organisms. [2 marks]	
	1	
	2	
		11



Do not write outside the box Turn over for the next question DO NOT WRITE ON THIS PAGE ANSWER IN THE SPACES PROVIDED



0 3

It is important to maintain water balance in the body.

Figure 4 shows how much water a person gained and lost by different methods in one day.

Figure 4 Water lost from the body Water gained by the body Volume Volume in cm³ in cm3 Food Drink Metabolism Skin Urine Faeces Breathing Method Method



	When water is balanced, the volume of water taken in by the body is equal to the volume of water lost from the body.	Do not write outside the box
0 3.1	Calculate the volume of water the person lost in one day in faeces. Use information from Figure 4. [2 marks]	
	Volume lost in faeces = cm ³	
0 3.2	Figure 4 shows that one method of gaining water is by metabolism. Which metabolic process produces water?	
	Tick one box.	
	Breakdown of protein to amino acids	
	Changing glycogen into glucose Digestion of fat	
	Respiration of glucose	
	Question 3 continues on the next page	



	The next day, the person ran a 10-kilometre race. The volume of water lost from the body through the skin and by breathing increased.	out
0 3.3	Explain why more water was lost through the skin during the race. [2 marks]	
0 3.4	Explain why more water was lost by breathing during the race. [3 marks]	



Do not write outside the box Turn over for the next question DO NOT WRITE ON THIS PAGE ANSWER IN THE SPACES PROVIDED

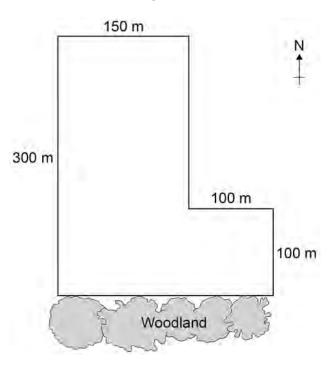


0 4

Some students investigated the size of a population of dandelion plants in a field.

Figure 5 shows the field.

Figure 5



The students:

- placed a 1 m x 1 m square quadrat at 10 random positions in the field
- counted the number of dandelion plants in each quadrat.

Table 2 shows the students' results.

Table 2

Quadrat number	Number of dandelion plants
1	6
2	9
3	5
4	8
5	0
6	10
7	2
8	1
9	8
10	11



0 4.1	Why did the students place the quadrats at random positions?	[1 mark]	Do not write outside the box
0 4.2	Estimate the total number of dandelion plants in the field. Calculate your answer using information from Figure 5 and Table 2. Give your answer in standard form.	[5 marks]	
	Total number of dandelion plants =		
	Question 4 continues on the next page		

	Quadrats 5, 7 and 8 were each placed less than 10 metres from the woodland.
	These quadrats contained low numbers of dandelion plants.
	The students made the hypothesis:
	'Light intensity affects the number of dandelion plants that grow in an area.'
0 4.3	Plan an investigation to test this hypothesis. [6 marks]



	17	
0 4.4	Light is an environmental factor that affects the growth of dandelion plants. Give two other environmental factors that affect the growth of dandelion plants. [2 marks]	Do not writ outside the box
	1	
	2	
		14
	Turn over for the next question	



Do not	write
outside	the
hox	(

- 0 5 Cell division is needed for growth and for reproduction.
- 0 5.1 Table 3 contains three statements about cell division.

Complete Table 3.

Tick **one** box for each statement.

[2 marks]

Table 3

	Sta	atement is true	for
Statement	Mitosis only	Meiosis only	Both mitosis and meiosis
All cells produced are genetically identical			
In humans, at the end of cell division each cell contains 23 chromosomes			
Involves DNA replication			



	Bluebell plants grow in woodlands in the UK.	Do not write outside the
	Bluebells can reproduce sexually by producing seeds.	box
	Bluebells can also reproduce asexually by making new bulbs.	
	bluebells carraiso reproduce asexually by making new builds.	
0 5 . 2	One advantage of asexual reproduction for bluebells is that only one parent is needed.	
	Suggest two other advantages of asexual reproduction for bluebells. [2 marks]	1
	1	_
		-
	2	-
		_
0 5 . 3	Explain why sexual reproduction is an advantage for bluebells.	
	[4 marks]]
		_
		-
		-
		_
		-
		_
		_
		-
		-
		_

8



0 6 Some students investigated geotropism in the roots of bean seedlings. Figure 6 shows the apparatus used. Figure 6 Cork mat Bean seedlings Damp blotting paper Rotates Motor Pin Apparatus A Apparatus B Stationary Rotating slowly This is the method used. Measure the length of the root of each of 10 bean seedlings. Pin 5 seedlings to the cork mat in apparatus A. Pin 5 seedlings to the cork mat in apparatus **B**. Leave **A** and **B** in a dark cupboard for 2 days. 5. After the 2 days: make a drawing to show the appearance of each seedling measure the length of the root of each seedling. 0 6 Why did the students surround the seedlings with damp blotting paper? [1 mark] Tick **one** box. To prevent light affecting the direction of root growth To prevent photosynthesis taking place in the roots To prevent the growth of mould on the roots To prevent water affecting the direction of root growth



					Apparatus B is a control.					
Apparatus B rotates slowly.										
0 6.2 How does app			s a con	trol?					[1	1 mark]
Table 4 shows	s the sti	udents'	results		ole 4					
		Ap	paratu	s A			Ap	paratu	s B	
Seedling number		2	3	4	5	1	2	3	4	5
start in mm	35	41	32	33	39	30	33	29	28	31
Length after 2 days in mm		57	43	45	54	45	45	44	29	44
Length change in mm		16	11	12	15	15	12	15	1	13
Mean length change in mm		14 11					11			
'The mean len	gth cha			_		aratus I	3 is not	t valid.'	['	1 mark]
Suggest one improvement the students could make to obtain a more valid mean length change for the seedlings in apparatus B .			an 1 mark]							
	umber start in mm er 2 days ange in mm h change in One student s 'The mean len Suggest the re	Table 4 shows the structumber 1 start in mm 35 er 2 days 49 ange in mm 14 h change in One student stated: 'The mean length charses the reason for the state of t	Table 4 shows the students' Apumber 1 2 Start in mm 35 41 Per 2 days 49 57 Ange in mm 14 16 The change in One student stated: 'The mean length change for Suggest the reason for the stated: Suggest one improvement the stated in the state	Table 4 shows the students' results Apparatus	Apparatus A umber 1 2 3 4 start in mm 35 41 32 33 er 2 days 49 57 43 45 unge in mm 14 16 11 12 th change in 14 One student stated: 'The mean length change for the seedlings Suggest the reason for the student's statent Suggest one improvement the students co	Table 4 shows the students' results. Table 4 Apparatus A umber 1 2 3 4 5 start in mm 35 41 32 33 39 er 2 days 49 57 43 45 54 unge in mm 14 16 11 12 15 th change in 14 One student stated: 'The mean length change for the seedlings in apparatus of the student's statement. Suggest one improvement the students could make	Table 4 shows the students' results. Table 4 Apparatus A umber	Table 4 shows the students' results. Table 4 Apparatus A Apparatus B Apparatus	Table 4 shows the students' results. Table 4 Apparatus A	Table 4 shows the students' results. Table 4 Apparatus A Apparatus B umber 1 2 3 4 5 1 2 3 4 start in mm 35 41 32 33 39 30 33 29 28 er 2 days 49 57 43 45 54 45 45 44 29 unge in mm 14 16 11 12 15 15 12 15 1 h change in 14 11 One student stated: 'The mean length change for the seedlings in apparatus B is not valid.' Suggest the reason for the student's statement. [Suggest one improvement the students could make to obtain a more valid mealength change for the seedlings in apparatus B.





0 6 . 5	Figure 7 shows the students' drawings of two seedlings at the end of the 2 days.
	Figure 7
	Seedling from Apparatus A Seedling from Apparatus B
	A plant hormone is made in the root tip.
	The hormone diffuses from the tip into the tissues of the root.
	Explain how the hormone causes the appearance of the seedlings in Figure 7 to be different.
	You should refer to both seedlings in your answer. [3 marks]



box

0 6 . 6 In horticulture plant hormones are used for controlling plant growth. Draw **one** line from each plant hormone to the correct use of that hormone. [3 marks] **Plant hormone Use of hormone** To reduce the time taken for tomatoes to ripen Auxin To slow down the growth of plant stems Ethene To promote seed germination Gibberellin To stimulate root growth

10

Turn over for the next question

in plant cuttings

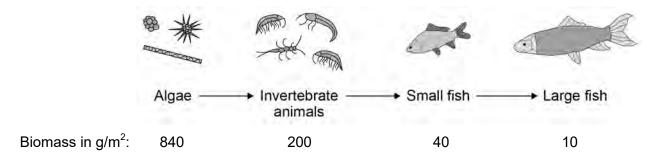


0 7

Figure 8 shows:

- a food chain for organisms in a river
- the biomass of the organisms at each trophic level.

Figure 8



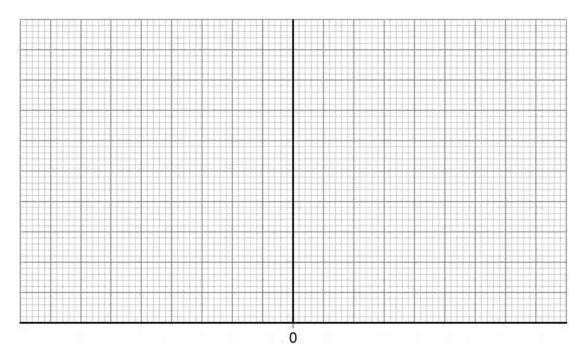
0 7. 1 Draw a pyramid of biomass for the food chain in Figure 8 on Figure 9.

You should:

- use a suitable scale
- label the x-axis
- label each trophic level.

[4 marks]

Figure 9





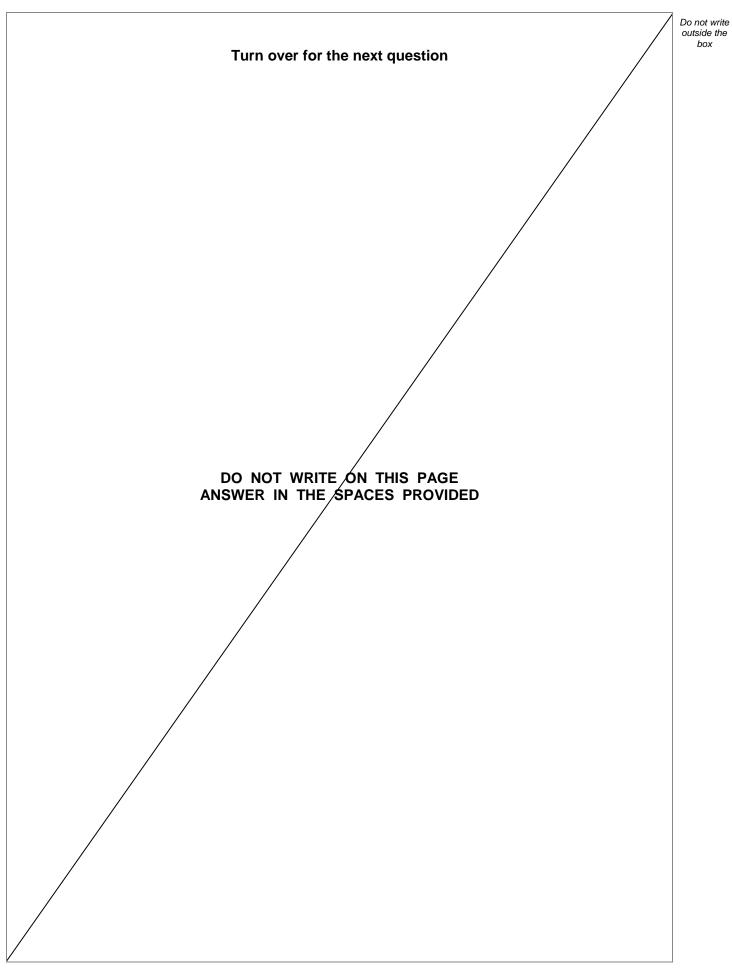
0 7.2	Calculate the percentage of the biomass lost between the algae and the large fish. Give your answer to 2 significant figures. [3 marks]	Do not write outside the box
	Percentage loss =	
0 7.3	Give one way that biomass is lost between trophic levels. [1 mark]	
	Question 7 continues on the next page	



0 7.4	A large amount of untreated sewage entered the river. Many fish died.	
	Untreated sewage contains organic matter and bacteria.	
	Explain why many fish died.	
	Explain my many non-alea.	[5 marks]



13





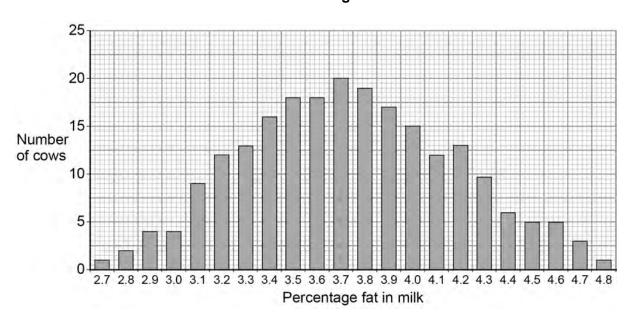
0 8

Scientists want to breed cows that produce milk with a low concentration of fat.

Figure 10 shows information about the milk in one group of cows.

The cows were all the same type.

Figure 10



0 8 . 1 In **Figure 10** the mean percentage of fat in the milk is equal to the modal value.

Give the mean percentage of fat in the milk of these cows.

[1 mark]

Mean percentage =

0 8 2 A student suggested:

'The percentage of fat in milk is controlled by one dominant allele and one recessive allele.'

How many different phenotypes would this produce?

[1 mark]

Tick one box.

2

3

22

46



0 8.3	Give the evidence from Figure 10 which shows the percentage of fat in the milk is controlled by several genes. [1 mark]	Do not write outside the box
0 8.4	One of the genes codes for an enzyme used in fat metabolism. A mutation in this gene causes a reduction in milk fat. The mutation changes one amino acid in the enzyme molecule.	
	Explain how a change in one amino acid in an enzyme molecule could stop the enzyme working. [3 marks]	
	Question 8 continues on the next page	

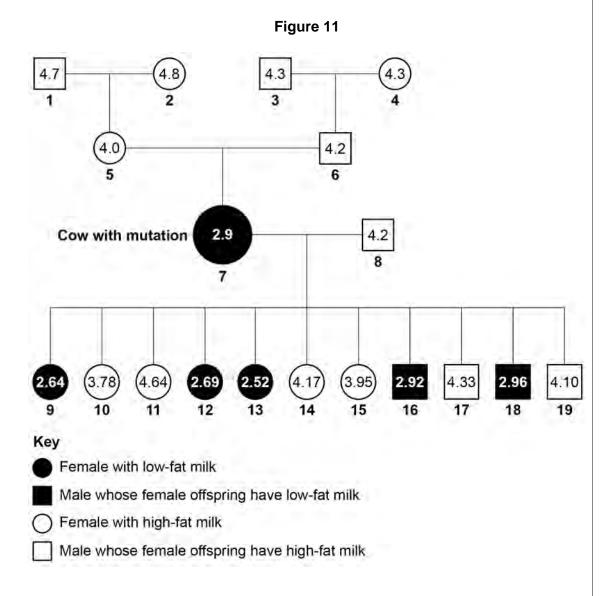


The scientists found one cow with a mutation.

The cow's milk contained only 2.9% fat.

Figure 11 shows the percentage of fat in the milk of cattle related to the cow with the mutation.

The values for male cattle are the mean values of their female offspring.





0 8.5	Animal 8 is homozygous.	Do not write outside the box
	The mutation in animal 7 produced a dominant allele for making low-fat milk.	
	Give evidence from Figure 11 that animal 7 is heterozygous. [1 mark]	
08.6	Animals 7 and 8 produced 11 offspring. These offspring were produced by in vitro fertilisation (IVF). The embryos from IVF were transferred into 11 other cows.	
	Suggest why IVF and embryo transfer were used rather than allowing animals 7 and 8	
	to mate naturally. [1 mark]	
0 8.7	Draw a Punnett square diagram to show a cross between animals 7 and 8 . Identify which offspring produce low-fat milk and which offspring produce high-fat milk.	
	Use the following symbols: D = dominant allele for making low-fat milk d = recessive allele for making high-fat milk	



		Do not write outside the
0 8 . 8	The scientists want to produce a type of cattle that makes large volumes of low-fat milk.	box
	The scientists will selectively breed some of the animals shown in Figure 11 .	
	Describe how the scientists would do this. [4 marks]	
	[4 marks]	
		16



0 9 Figure 12 shows a ring-tailed lemur.

Do not write outside the box

Figure 12



Table 5 shows part of the classification of the ring-tailed lemur.

Table 5

Classification group	Name
Kingdom	Animalia
Phylum	Chordata
	Mammalia
	Primates
	Lemuroidea
Genus	Lemur
	catta

0 9 . 1 Complete **Table 5** to give the names of the missing classification groups.

[2 marks]

0 9.2 Give the binomial name of the ring-tailed lemur.

Use information from Table 5.

[1 mark]



Lemurs are only found on the island of Madagascar.

Madagascar is off the coast of Africa.

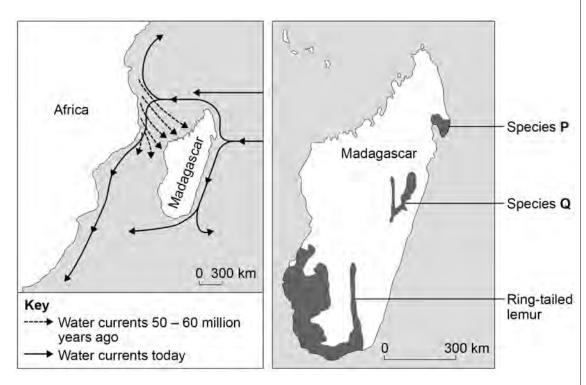
Scientists think that ancestors of modern lemurs evolved in Africa and reached Madagascar about 50-60 million years ago.

Today there are many species of lemur living on Madagascar.

Figure 13 shows information about water currents.

Figure 14 shows the distribution of three species of lemur on Madagascar.

Figure 13 Figure 14



0 9 . 3 Suggest how ancestors of modern lemurs reached Madagascar.

[1 mark]



35	
Describe how the ancestors of modern lemurs may have evolved into the species shown in Figure 14 .	Do ou
[5 marks]	
END OF QUESTIONS	
END OF MOESTIONS	
	l l
	Describe how the ancestors of modern lemurs may have evolved into the species shown in Figure 14 .



36

There are no questions printed on this page DO NOT WRITE ON THIS PAGE ANSWER IN THE SPACES PROVIDED Copyright information For confidentiality purposes, from the November 2015 examination series, acknowledgements of third party copyright material will be published in a separate booklet rather than including them on the examination paper or support materials. This booklet is published after each examination series and is available for free download from www.aqa.org.uk after the live examination series.

Permission to reproduce all copyright material has been applied for. In some cases, efforts to contact copyright-holders may have been unsuccessful and AQA will be happy to rectify any omissions of acknowledgements. If you have any queries please contact the Copyright Team, AQA, Stag Hill House, Guildford, GU2 7XJ.

Copyright © 2018 AQA and its licensors. All rights reserved.

