Centre No.			Paper Reference					Surname	Initial(s)		
Candidate No.			6	1	0	5	/	0	1	Signature	

Paper Reference(s)

6105/01

Edexcel GCE

Biology Advanced

Unit 5B

Tuesday 20 June 2006 – Morning

Time: 1 hour 30 minutes

Materials required for examination Ruler

Items included with question papers

Nil

Examiner's use only Team Leader's use only

Question Number	Leave Blank
1	
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4

Instructions to Candidates

In the boxes above, write your centre number, candidate number, your surname, initial(s) and signature.

Check that you have the correct question paper.

Answer ALL questions in the spaces provided in this booklet.

Show all the steps in any calculations and state the units. Calculators may be used.

Include diagrams in your answers where these are helpful.

Information for Candidates

The marks for individual questions and parts of questions are shown in round brackets: e.g. (2). The total mark for this question paper is 70.

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You will be assessed on your ability to organise and present information, ideas, descriptions and arguments clearly and logically, taking account of your use of grammar, punctuation and spelling. The Synoptic section (Questions 4 to 7) is designed to give you the opportunity to make connections between different areas of biology and to use skills and ideas developed throughout the course in new contexts. You should include in your answers any relevant information from the whole of your course.

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Total



W850/R6105/57570 7/7/7/3/

Answer ALL questions in the spaces provided.

1. The table below refers to the five kingdoms and some of their characteristic features. Complete the table by writing the name of the kingdom in the blank spaces.

Characteristic features	Kingdom
 Eukaryotic organisms Single-celled, or consists of groups of similar cells 	Proctoctista
Eukaryotic organismsPhotosyntheticCell walls that contain cellulose	
 Unicellular No nucleus within a membrane No membrane-bound organelles	
Eukaryotic organismsNon-photosyntheticNon-cellulose cell wall	
Eukaryotic organismsCannot carry out photosynthesisHave nervous co-ordination	

Q1

(Total 4 marks)

2.	(a)	Distinguish between the terms gene and allele.	
		Internamentes Lorentes Lorente	
		pieta the table by writing the mand or grown in the blank spaces.	
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		1192 Hughida	 2)
		Marfan's Syndrome is a rare genetic disease which affects the eyes, heart and bone The family tree below shows how this disease was inherited through three generation of a family. A B	
		C D E F G H	
		unaffected female unaffected male female with Marfan Syndrome male with Marfan's Syndrome	's



(i)	Male A is an unaffected homozygous individual. State whether the allele for Marfan's Syndrome is dominant or recessive. Explain your answer.
	(2)
(ii)	Using the symbols of $\bf D$ for dominant allele and $\bf d$ for recessive allele, show the genotype for the following individuals.
	В
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(iii) Individuals C and D have one affected child. Use a genetic diagram to determine the probability of their next child being affected.

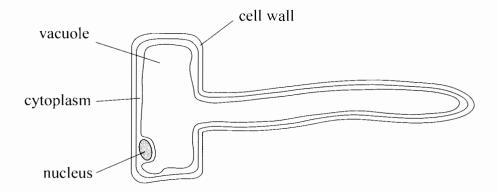


disease. Suggest how this could be possible.	
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(4)

3. The diagram below shows a root hair cell.



(a)	Describe how the shape of a root hair cell increases the efficiency of absorption of water and mineral ions from the soil solution.
	(1)
(b)	Mineral ions can be taken up by root hair cells and may accumulate at higher concentrations than in the soil solution. Explain how mineral ions are taken up by root hair cells.





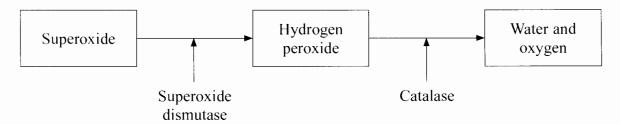
Synoptic Section.

The questions in this section are designed to give you the opportunity to make connections between different areas of biology and to use skills and ideas developed throughout the course in new contexts. You should include in your answers any relevant information from the whole of your course.

4. Oxidative phosphorylation is an important process that increases the output of ATP from respiratory metabolism. This process is dependent upon the electron transport chain in mitochondria.

The electron transport chain produces free radicals, known as Reactive Oxygen Species (ROS), as by-products. Two examples of ROS are superoxide and hydrogen peroxide.

ROS react with fatty acids causing damage to membranes within cells. In order to prevent the accumulation of damaging levels of ROS, certain enzymes must be produced by the cell. The action of two of these enzymes, superoxide dismutase and catalase, is shown in the diagram below.



(a)	Explain why the term oxidative phosphorylation is used to describe the synthesis of ATP as a result of electron transport chain activity.
	(2)





Leave

- 5. The fox (*Vulpes vulpes*) is a common mammal living in both rural (country) and urban (town) areas of the United Kingdom. Foxes eat a variety of foods including berries, rabbits, small birds and rodents such as rats and mice.
 - (a) The photograph below shows the skull of the fox. Describe **two** features of the teeth of this fox that are an adaptation for feeding on small mammals.

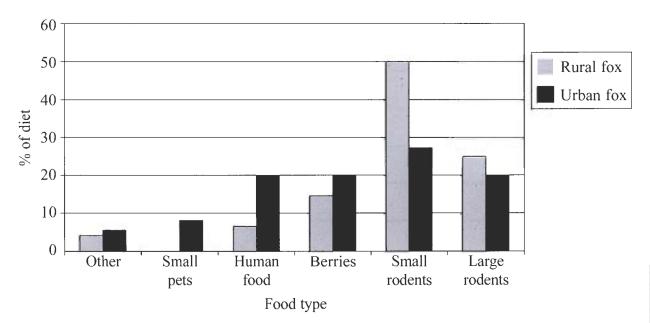


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(b) A number of studies have investigated the differences between the diets of rural foxes and foxes living in urban areas. The results of one study are shown below.



(i)	Compare	the	diet of	the	rural	fox	with	the	diet	of	the	urban	fox
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(ii)	Human food was found to have a high content of carbohydrates and fats.	Suggest
	how this could affect the time spent looking for food and the quantity	of food
	eaten by the urban foxes.	

(2)

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(c)	(i)	Foxes are territorial animals. Rural foxes commonly have territories between two and six $\rm km^2$ (200 to 600 hectares) in size. Urban foxes have a much smaller territory of less than $0.6~\rm km^2$. Explain how this could affect the population of foxes in urban areas.
		(2)
	(ii)	Suggest one factor, other than food and territory size, that could affect the population size of the urban fox.
		(1)



(4) (Total 13 marks)	It has been suggested that the teeth of the urban fox are changing as their diet changes. Describe how the rural and urban foxes could evolve into separate species.	THE THEORY IS A COMMUNICATION OF THE THEORY.
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of Ma site cor	the transmitter substance, acetylcholine, found at synapses in the nervous system. In this enzyme catalyses the rapid hydrolysis of acetylcholine in the synapse. Insects the enzyme catalyses the rapid hydrolysis of acetylcholine in the synapse. Insects ming into contact with relatively small quantities of malathion suffer from a severe ruption of the functioning of their nervous system which leads to their death.
(a)	Malathion is an active site-directed enzyme inhibitor. Explain what is meant by the term active site-directed enzyme inhibitor.
(b)	With reference to the function of acetylcholine, explain why malathion can lead to severe disruption of the functioning of an insect's nervous system.
(b)	With reference to the function of acetylcholine, explain why malathion can lead to
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c)	Suggest why it is easier to control insects in fruit, vegetable and grain stores by chemical means rather than by using biological control.
	(2)

(d) The table below shows the percentage of fruits, vegetables and grains with detectable organophosphate residues in the USA from 1994 to 2001.

Year	Percentage of fruits, vegetables and grains with detectable organophosphate residues
1994	21
1995	24
1996	29
1997	28
1998	23
1999	24
2000	23
2001	19

[Data adapted from US Department of Agriculture, Pesticide Data Program]

Suggest how the data n DDT, had been used ins	night have differed if non tead of organophosphates	n-biodegradable pesticides, such as s. Explain your answer.
		(Total 12 marks)
		(Total 12 marks)

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7.	(a)	Explain what is meant by the term gross primary production (GPP).
		(2)

(b) The table below shows the flow of energy in a tropical rainforest.

Trophic level	Energy entering trophic level/kJ m ⁻² year ⁻¹
Producers	180.0×10^{3}
Primary consumers	5.0 ×10 ³
Secondary consumers	4.5 ×10 ³
Tertiary consumers	3.4×10 ³
Decomposers	28.4×10 ³

(i) Energy is transferred between trophic levels. If the producers lose $145 \times 10^3 \, \text{kJ} \, \text{m}^{-2} \, \text{year}^{-1}$ in respiration, calculate the percentage of net primary production (NPP) which is passed to the primary consumers. Show your working.

(3)



(ii)	Explain the role of decomposers in a food chain.
	(2)
(iii)	The productivity of a temperate forest in Europe is much lower than that of a tropical rainforest. Suggest reasons for this difference.
	(2)



	TOTAL FOR PAPER: 70 MARKS END
	(Total 12 marks)
	(3)
(c)	Describe how a forest could be managed sustainably in order to ensure a continual supply of timber for the future.

Centre No.					Pape	r Refer	ence			Surname	Initial(s)
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Paper Reference(s)

6115/01

Edexcel GCE

Biology (Human)

Advanced

Unit 5H

Tuesday 20 June 2006 – Morning

Time: 1 hour 30 minutes

Materials required for examination Ruler

Items included with question papers

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Question Number	Leave Blank
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Instructions to Candidates

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In the boxes above, write your centre number, candidate number, your surname, initial(s) and signature.

Check that you have the correct question paper.

Answer ALL questions in the spaces provided in this booklet.

Show all the steps in any calculations and state the units. Calculators may be used.

Include diagrams in your answers where these are helpful.

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Total





W850/R6115/57570 7/7/7/3/

Answer ALL questions in the spaces provided.

1. The table below lists some of the characteristic features of the four superfamilies that make up the order of Primates. Complete the table by writing the name of the superfamily in the blank spaces.

Characteristic features	Superfamily
No tailFree-swinging arm movementsNails	
 Prehensile tail Flat nose with separate nostrils	
Non-prehensile tailMost have claws	
 All limbs similar length Walk on all fours Non-prehensile tail Downward-facing nostrils 	

Q1

(Total 4 marks)

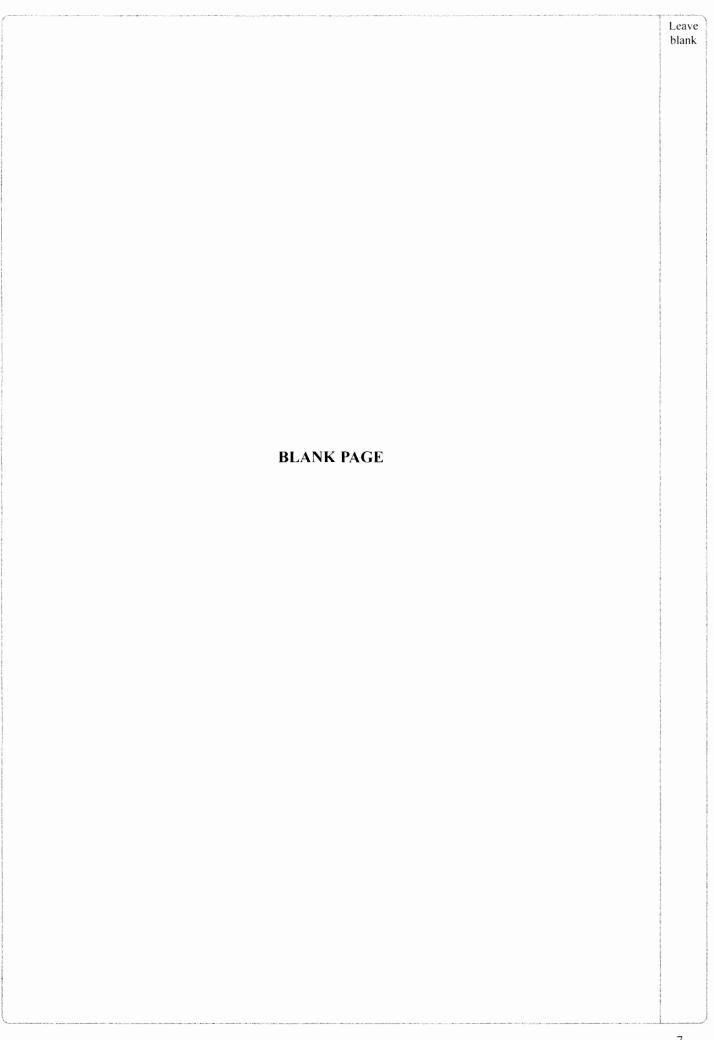
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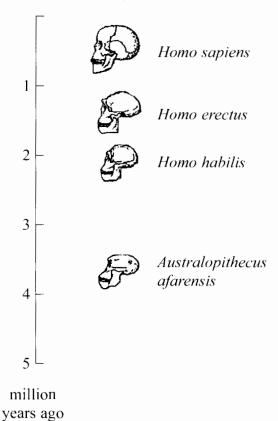
(i)	Male A is an unaffected homozygous individual. State whether the allele Marfan's Syndrome is dominant or recessive. Explain your answer.	for
		••••
		(2)
(ii)	Using the symbols of $\bf D$ for dominant allele and $\bf d$ for recessive allele, show genotype for the following individuals.	the
	В	
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(iii) Individuals C and D have one affected child. Use a genetic diagram to determine the probability of their next child being affected.

(c)	A genetic disease can suddenly appear in a family with no previous history of the disease. Suggest how this could be possible.	Leave blank
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	(2) (Total 11 marks)	Q2



3. The diagram below shows a time scale and the skull of a modern human, *Homo sapiens*, together with those of some possible ancestors.



(a) State **one** structural feature that would be visible on the cranium of the skull of *Australopithecus afarensis* that would not be visible on any of the species of *Homo*.

(1)

(b) State **two** pieces of fossil evidence that might be used to indicate whether an ancestral hominid species was capable of bipedal walking.

.....

(2)



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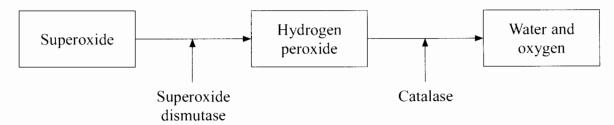
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The electron transport chain produces free radicals, known as Reactive Oxygen Species (ROS), as by-products. Two examples of ROS are superoxide and hydrogen peroxide.

ROS react with fatty acids causing damage to membranes within cells. In order to prevent the accumulation of damaging levels of ROS, certain enzymes must be produced by the cell. The action of two of these enzymes, superoxide dismutase and catalase, is shown in the diagram below.



ATP as a result of electron transport chain activity.	11



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- 5. The fox (*Vulpes vulpes*) is a common mammal living in both rural (country) and urban (town) areas of the United Kingdom. Foxes eat a variety of foods including berries, rabbits, small birds and rodents such as rats and mice.
 - (a) The photograph below shows the skull of the fox. Describe **two** features of the teeth of this fox that are an adaptation for feeding on small mammals.

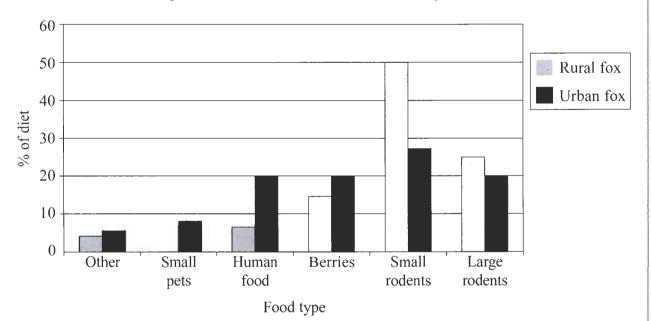


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(b) A number of studies have investigated the differences between the diets of rural foxes and foxes living in urban areas. The results of one study are shown below.



(i)	Compare	the	diet	of	the	rural	fox	with	the	diet	of	the	urban	fox
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(ii)	Human food was found to have a high content of carbohydrates and fats.	Sugges
	how this could affect the time spent looking for food and the quantity	of food
	eaten by the urban foxes.	

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(c)	It has been suggested that the teeth of the urban fox are changing as their diet changes. Describe how the rural and urban foxes could evolve into separate species.	Leave blank
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	(4)	tis detta detta etta että jälkississa suoda
(d)	The fox is closely related to the dog, a domesticated animal. Describe the characteristics of an animal that make it suitable for domestication.	
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(a)	Malathion is an active site-directed enzyme inhibitor. Explain what is meant by the term active site-directed enzyme inhibitor .
	(2)
b)	With reference to the function of acetylcholine, explain why malathion can lead to severe disruption of the functioning of an insect's nervous system.
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(c)	Suggest why it is easier to control insects in fruit, vegetable and grain stores by chemical means rather than by using biological control.	/
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(d) The table below shows the percentage of fruits, vegetables and grains with detectable organophosphate residues in the USA from 1994 to 2001.

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1997	28
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2000	23
2001	19

[Data adapted from US Department of Agriculture, Pesticide Data Program]

DDT, had been used instead of organophosphates. Explain your answer.	Suggest how the data might have differed if non-biodegradable pesticides, s	such as
	DDT, had been used instead of organophosphates. Explain your answer.	such us
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7.	(a)	Explain what is meant by the term gross primary production (GPP).
		(2)

(b) The table below shows the flow of energy in a tropical rainforest.

Trophic level	Energy entering trophic level/kJ m ⁻² year ⁻¹
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(i) Energy is transferred between trophic levels. If the producers lose $145 \times 10^3 \, \text{kJ m}^{-2} \, \text{year}^{-1}$ in respiration, calculate the percentage of net primary production (NPP) which is passed to the primary consumers. Show your working.

Answer%

(3)



(c)	Describe how a forest could be managed sustainably in order to ensure a continual supply of timber for the future.	Lea blai
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