

ADVANCED SUBSIDIARY GCE F212 BIOLOGY Molecules, Biodiversity, Food and Health Monday 1 June 2009 Candidates answer on the question paper **OCR Supplied Materials:** None Duration: 1 hour 45 minutes **Other Materials Required:** Electronic calculator Ruler (cm/mm)

Afternoon



Forename Surname

Centre Number	Candidate Number
---------------	------------------

INSTRUCTIONS TO CANDIDATES

- Write your name clearly in capital letters, your Centre Number and Candidate Number in the boxes above.
- Use black ink. Pencil may be used for graphs and diagrams only.
- Read each question carefully and make sure that you know what you have to do before starting your answer.
- Answer all the questions.
- Do not write in the bar codes.
- Write your answer to each question in the space provided, however additional paper may be used if necessary.

INFORMATION FOR CANDIDATES

- The number of marks is given in brackets [] at the end of each question or part question.
- The total number of marks for this paper is 100.
- You may use an electronic calculator.
- You are advised to show all the steps in any calculations.

Where you see this icon you will be awarded marks for the quality of written communication in your answer.

This document consists of 20 pages. Any blank pages are indicated.

FOR EXAMINER'S USE				
Qu.	Max.	Mark		
1	14			
2	16			
3	18			
4	16			
5	17			
6	19			
TOTAL	100			



Answer all the questions.

(a) Complete the following passage by using the most appropriate terms from the list to fill the gaps.Each term should not be used more than once.

anti-parallel	β -pleated sheet	covalent
double helix	hydrogen	parallel
polypeptide	ribose	sugar-phosphate

(b) Table 1.1 shows the relative proportions of different DNA bases in four different organisms.

Table 1.1

	relative proportions of bases in DNA as a percentage					
organism	А	С	G	Т		
human	30.9	19.8	19.9	29.4		
grasshopper	29.3	20.7	20.5	29.3		
wheat	27.3	22.8	22.7	27.1		
E. coli	24.7	25.7	26.0	23.6		

(i) Describe the patterns shown by the data given in Table 1.1.

[3]

(ii) Suggest how the data given in Table 1.1 might have been helpful to scientists in working out the structure of DNA.

(c) DNA in the nucleus acts as a template for the production of RNA.

Complete the table below to show **three** ways in which the structure of DNA differs from that of RNA.

feature	DNA	RNA
number of strands		
bases present		
sugar present		

[3]

(d) DNA codes for the structure of polypeptides.

State the role of messenger RNA (mRNA).

[2] [Total: 14] 2 Malaria kills over one million people every year, the vast majority being under the age of ten.

Adults who have survived malaria in childhood and then continue to live in an area where malaria is found, develop a limited form of immunity.

(a) (i) Name the parasite that causes malaria.

(ii) Name the vector for the malarial parasite.
[1]
(iii) Name a human cell in which the malarial parasite reproduces.

......[1]

(b) Scientists are developing a vaccine using an attenuated (inactive) form of the malarial parasite.

The aim is to trigger an immune response without the development of the disease.

Describe the actions of the **B** lymphocytes in the immune response.



In your answer you should make clear how the steps in this part of the immune response are sequenced.

.....[8] (c) Suggest why adults who have survived malaria may lose their immunity when they leave a malarial area.[2] (d) State three biological reasons why it has not been possible to produce an effective vaccine for malaria.[3] [Total: 16] 3 In the search for new biofuels, research has been done into the digestion of wood waste by fungi.

The cellulase enzymes produced by the fungi break cellulose into sugars. These sugars can then be converted into ethanol, a biofuel.

Fig. 3.1 shows the stages in this digestion process.





A [2] B [2] (ii) State how bond B is broken in the digestion of the disaccharide. [1] (iii) Name the sugar that is the final product of this digestion process. [1]	(a)	(i)	Name bonds A and B shown in Fig. 3.1.	
 (ii) State how bond B is broken in the digestion of the disaccharide. 			Α	
(iii) Name the sugar that is the final product of this digestion process.			В	[2]
(iii) Name the sugar that is the final product of this digestion process.		(ii)	State how bond B is broken in the digestion of the disaccharide.	
(iii) Name the sugar that is the final product of this digestion process.				
				[1]
[1]		(iii)	Name the sugar that is the final product of this digestion process.	
				[1]

(b) Explain why different enzymes are involved in each stage of the digestion process.

QUESTION 3 CONTINUES ON PAGE 8



Fig. 3.2

 (d) The activity of an enzyme can be measured by testing for the concentration of its product at regular intervals.

Describe how the concentration of a reducing sugar can be measured using a colorimeter.

[6]
[Total: 18]

- vultures feed on carcasses including those from farm animals.
- these farm animals may have been treated with a pain killer. This particular pain killer causes kidney failure in the vultures.
- the use of this pain killer is being phased out. However, many farmers continue to use up their stocks of the drug.
- this pain killer is not easily biodegradable and will remain in the environment for many years.
- (a) (i) Suggest what is meant by *critically endangered*.

......[1]

(ii) Calculate the original population of the white-backed vulture.

Show your working.

(b) In an effort to save the white-backed vulture, a captive breeding programme has been set up.

Three centres in India have been built, each housing up to 40 individuals. These vultures have been collected from different areas of the Indian subcontinent.

(i) Explain why the decision was made to conserve the species in captivity (*ex situ*) rather than in the wild (*in situ*).

.....[4] (ii) Explain why the white-backed vultures in the captive breeding programme were, collected from several different areas housed in three separate centres.[3] (c) Outline three reasons why the conservation of the white-backed vulture is important. 1 2 3[3] (d) Suggest three measures that could be taken in the long term to preserve the numbers of white-backed vultures, once the captive bred individuals have been released into the wild.

[Total: 16]

5 (a) Fig. 5.1 shows a section of a leaf from a pear tree that is infected by the mildew fungus.





(i) State **one** feature, **shown in Fig. 5.1**, that excludes **both** the pear tree and mildew from the kingdom Prokaryotae.

(ii) State two reasons why mildew should be placed in the kingdom Fungi.
 (iii) State two reasons why the pear tree should be placed in the kingdom Plantae.
 [2]
 (iii) State two reasons why the pear tree should be placed in the kingdom Plantae.

- (iv) Name two kingdoms other than Prokaryotae, Fungi and Plantae.
- (b) The mildew fungus also infects wheat plants, causing disease.
 - Most wheat plants in the UK show little resistance to this disease.
 - Some Iranian wheat plants are resistant.
 - The yield from these resistant wheat plants is very low.
 - (i) An investigation into the resistance of the Iranian wheat plants to mildew produced the results shown in Fig. 5.2.





State the type of variation that is shown in Fig. 5.2 and describe its characteristics.

type of variation

characteristic of this type of variation

[3]

(ii) Outline how a breeding programme could be carried out to produce wheat plants which have both high yield **and** resistance to mildew.

			resistance.	
			resistance.	
w fungus adapts to overcome this	n to explain how the	of natural selection	Use the theory	
bred into the wheat.	n overcome the resis	of time, mildew can	Over a period o	(c)
[3]				

6 (a) Fig. 6.1 shows a diagram of alveoli in a healthy lung and alveoli in a lung from a person with advanced emphysema.



alveoli in a healthy lung alveoli from a person with advanced emphysema

Fig. 6.1

(i) Describe how smoking could cause changes in alveoli, such as those shown in Fig. 6.1.

In your answer you should make the links between the changes and their causes clear.

.....[6] (ii) Emphysema is a form of chronic obstructive pulmonary disease (COPD). Describe two signs or symptoms of emphysema. (iii) Emphysema is described as a chronic disease. Suggest the meaning of the term *chronic*. _____[2]

17

(b) An investigation was conducted into the effect of smoking on lung function. One measure of lung function is peak flow rate.

The peak flow rate is the maximum volume of air expelled from the lungs in one minute $(dm^3 min^{-1})$.

Two male volunteers, one a smoker and one a non-smoker, had their peak flow measured once a year for seven years.





(i) **Describe** the data shown in Fig. 6.2.

	 	 	 	 [4]

(ii)	Explain the results obtained for the smoker.
	[2]
(iii)	Suggest three ways of improving the reliability of this investigation.
(111)	Suggest mee ways of improving the reliability of this investigation.
	[3]
	[Total: 19]

END OF QUESTION PAPER

PLEASE DO NOT WRITE ON THIS PAGE



Copyright Information

OCR is committed to seeking permission to reproduce all third-party content that it uses in its assessment materials. OCR has attempted to identify and contact all copyright holders whose work is used in this paper. To avoid the issue of disclosure of answer-related information to candidates, all copyright acknowledgements are reproduced in the OCR Copyright Acknowledgements Booklet. This is produced for each series of examinations, is given to all schools that receive assessment material and is freely available to download from our public website (www.ocr.org.uk) after the live examination series.

If OCR has unwittingly failed to correctly acknowledge or clear any third-party content in this assessment material, OCR will be happy to correct its mistake at the earliest possible opportunity.

For queries or further information please contact the Copyright Team, First Floor, 9 Hills Road, Cambridge CB2 1PB.

OCR is part of the Cambridge Assessment Group; Cambridge Assessment is the brand name of University of Cambridge Local Examinations Syndicate (UCLES), which is itself a department of the University of Cambridge.