OCR
RECOGNISING ACHIEVEMENT

Tuesday 15 January 2013 – Afternoon

AS GCE BIOLOGY

F212/01 Molecules, Biodiversity, Food and Health

Candidates answer on the Question Paper.

OCR supplied materials:
None

Other materials required:
- Electronic calculator
- Ruler (cm/mm)

Duration: 1 hour 45 minutes

F21203011 3

F 2 1 2 0 1

Candidate forename		Candidate surname	

Centre number						Candidate number				

INSTRUCTIONS TO CANDIDATES

- Write your name, centre number and candidate number in the boxes above. Please write clearly and in capital letters.
- Use black ink. HB pencil may be used for graphs and diagrams only.
- Answer **all** the questions.
- Read each question carefully. Make sure you know what you have to do before starting your answer.
- Write your answer to each question in the space provided. If additional space is required, you should use the lined pages at the end of this booklet. The question number(s) must be clearly shown.
- Do **not** write in the bar codes.

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**.
- Where you see this icon you will be awarded marks for the quality of written communication in your answer.
- You may use an electronic calculator.
- You are advised to show all the steps in any calculations.
- This document consists of **24** pages. Any blank pages are indicated.

© OCR 2013 [M/500/8551]
OCR is an exempt Charity

Answer **all** the questions.

1 Many insects live in freshwater habitats such as rivers and ponds for part of their life cycle.

Fig. 1.1 shows a labelled diagram of a generalised insect along with six common insects found in freshwater in the UK.

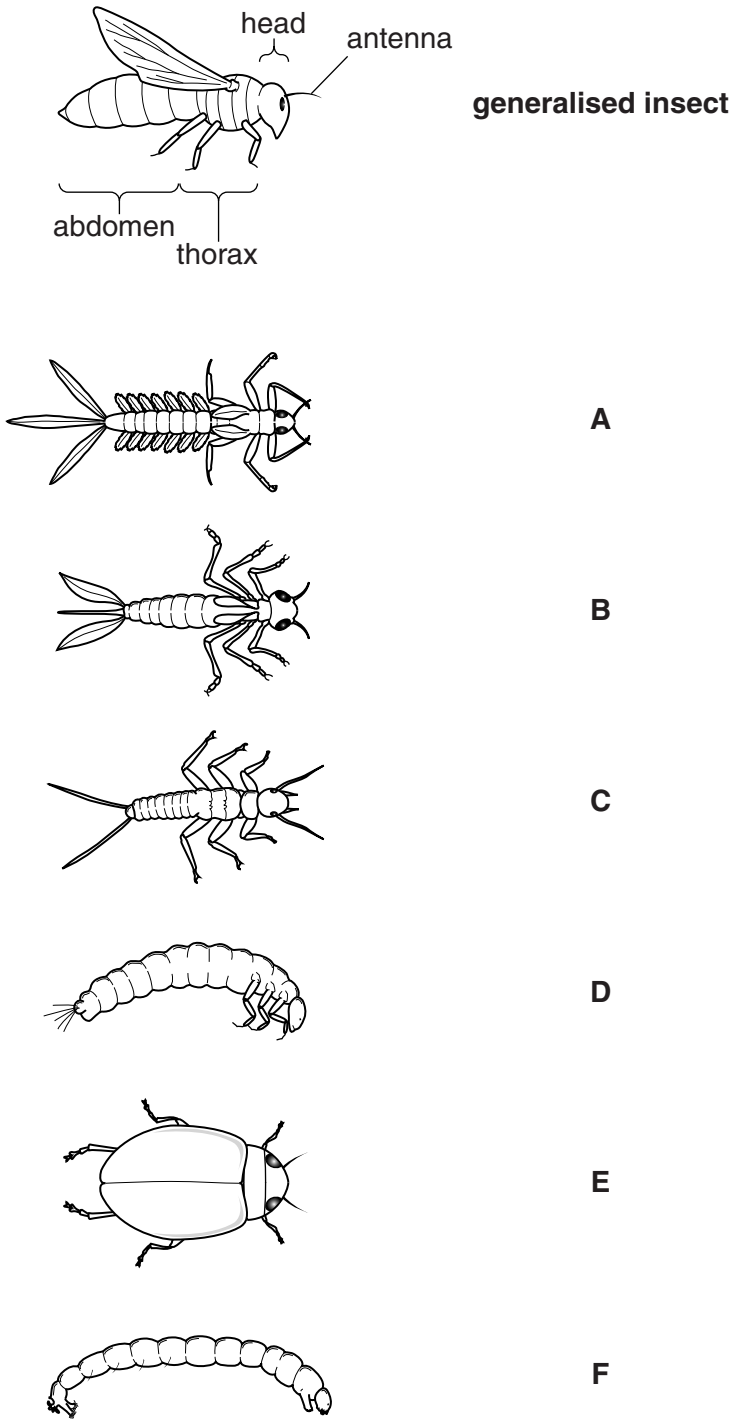


Fig. 1.1

© OCR 2013

Table 1.1 below shows a dichotomous key used for the classification of insects.

Key:			
Question 1	Does it have jointed limbs?	yes no	go to question 2 **bloodworm**
Question 2	Does it have an oval body shape?	yes no	**diving beetle** go to question 3
Question 3	Is the length of the tail greater than the length of three abdominal segments?	yes no	go to question 4 **caddis fly larva**
Question 4	Are gills attached to the abdominal segments?	yes no	**mayfly larva** go to question 5
Question 5	Does it have two narrow tails?	yes no	**stonefly larva** **damsel fly larva**

Table 1.1

(a) (i) Use Table 1.1 to identify the insects labelled **A** to **F** shown in Fig. 1.1.

A .....

B .....

C.....

D .....

E .....

F .....

[2]

(ii) Why is the key in Table 1.1 described as a *dichotomous* key?

.....

..... **[1]**

(b) Suggest an adaptation shown by at least one of the insects in Fig. 1.1 that allows them to survive in an aquatic habitat.

.....

..... **[1]**

© OCR 2013

(c) Insects belong to the animal kingdom within the domain *Eukaryota*.

(i) Suggest **one** feature of the cells of insects that would identify insects as belonging to the domain *Eukaryota*.

.....

..... **[1]**

(ii) State **two** features that are present in the eukaryotic cells of plants that are **absent** from the cells of insects.

1 .....

2 .....

[2]

[Total: 7]

© OCR 2013

BLANK PAGE

Question 2 begins on page 6

PLEASE DO NOT WRITE ON THIS PAGE

© OCR 2013

2 **(a)** In the UK in 2009, there was a major outbreak of a type of influenza known as 'swine flu'.

'Swine flu' was caused by a new strain of the influenza virus.

Explain why the influenza virus is usually described as a *pathogen* rather than a *parasite*.

.....

.....

.....

.....

.....

.....

.....

..... **[3]**

(b) When an individual is infected with a virus, an immune response is triggered.

(i) Define the term *immune response*.

.....

.....

.....

..... **[2]**

© OCR 2013

(ii) One type of cell involved in an immune response is a plasma cell, which releases antibodies.

Plasma cells contain RNA.

Outline the roles of RNA in plasma cells.



In your answer you should give an account of the different roles of RNA.

.....

.....

.....

(iii) Outline **two** ways in which antibodies reduce the threat from pathogens.

.....

.....

.....

.....

.....

.....

.....

..... **[4]**

(c) (i) In an attempt to reduce the consequences of further outbreaks of influenza, the government encourages immunisation of key groups of people, such as the elderly and children that have another risk factor.

Suggest **two other** groups who should be immunised **and** explain why immunisation for them would be particularly important.

1 .....

.....

.....

.....

2 .....

.....

.....

.....

[4]

(ii) Immunisation of large numbers of people costs the UK government a lot of money.

Other than the direct effects on health or reducing the number of deaths, suggest a reason why spending a large amount of money on immunisation is considered worthwhile.

.....

.....

..... **[1]**

© OCR 2013

(iii) Much of the money spent on immunisation programmes is used to publicise the health benefits of immunisation. Despite this, some individuals are reluctant to have the immunisation.

Give **one** reason why, despite being aware of the immunisation programme, some people choose not to be immunised.

.....

.....

..... **[1]**

[Total: 21]

Question 3 begins on page 10

© OCR 2013

3 **(a)** Complete the passage below using the most appropriate terms.

Enzymes are ..... proteins and are therefore soluble. They alter the rate of metabolic reactions and are described as biological ..... .

Some enzymes, such as those found in cytoplasm, are described as ..... enzymes. Other enzymes, such as those that digest food in the small intestine, are known as ..... enzymes. Some medicinal drugs reduce enzyme activity. These are called enzyme ..... . **[5]**

(b) Many enzymes are associated with non-protein molecules known as cofactors. Some cofactors are small inorganic ions.

Rennin is an enzyme that is involved in the digestion of milk. It converts soluble caseinogen in milk into insoluble casein. The cofactor Ca^{2+} is associated with this reaction.

A student wished to investigate the effect of Ca^{2+} on the action of rennin.

Describe how the student could carry out this investigation and produce valid results.

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

..... **[5]**

© OCR 2013

(c) Enzyme cofactors are often derived from vitamins and minerals in the diet.

Proteins are required in large amounts in the diet whereas vitamins and minerals are required only in small amounts.

Suggest why.

.....

.....

..... **[1]**

[Total: 11]

Question 4 begins on page 12

© OCR 2013

4 **(a)** Lipids form an important part of a balanced diet but if too many lipids are consumed this can result in obesity.

What is meant by the term *balanced diet*?

.....

.....

.....

..... **[2]**

(b) **(i)** Lipids are used for energy storage and as a respiratory substrate.

List **three** other roles of lipids in the human body.

1 .....

.....

2 .....

.....

3 .....

.....

[3]

(ii) Other than obesity, outline why a diet high in lipids might have a negative effect on the health of an individual.

.....

.....

.....

.....

.....

.....

..... **[3]**

© OCR 2013

(c) Two examples of lipid molecules are triglycerides and phospholipids.

Identify **two** differences and **two** similarities in the **structures** of triglycerides and phospholipids.

Write your answers in the appropriate boxes in the table below.

	Triglyceride	**Phospholipid**
Difference		
Difference		
Similarity		
Similarity		

[4]

(d) It is possible to test for the presence of lipids in a food sample.

(i) Name the test used to identify the presence of lipids.

..... **[1]**

(ii) Describe how you would carry out this test on a food sample.

.....

.....

.....

.....

.....

.....

..... **[3]**

(iii) State the expected result if lipid is present in the food sample.

.....

..... **[1]**

[Total: 17]

© OCR 2013

5 Scientists have identified approximately 1.8 million different species. The number of species that actually exist is likely to be significantly higher than 1.8 million.

(a) Suggest **two** reasons why the number of species identified is likely to be lower than the actual number of species present on Earth.

1 .....

.....

2 .....

.....

[2]

(b) Many organisations, such as the International Union for the Conservation of Nature (IUCN), gather annual data about the number of species that are known to exist and to what extent they are considered to be endangered.

Fig. 5.1 shows the total number of species assessed by the IUCN over a 10 year period and the number of those species assessed that are considered to be threatened with extinction.

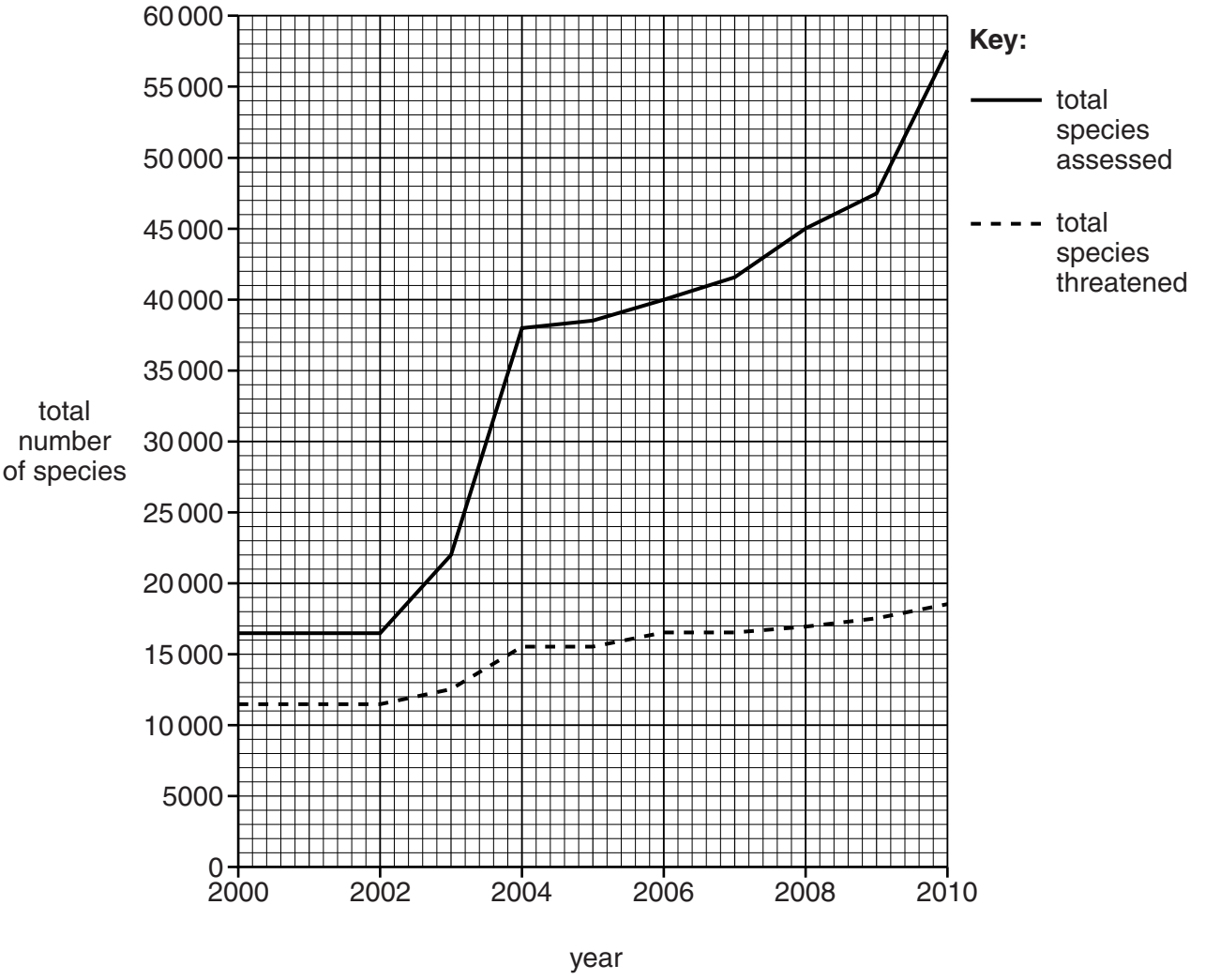


Fig. 5.1

© OCR 2013

(i) Using Fig. 5.1, **compare** the changes in the total number of species assessed with the changes in the total number of threatened species over the 10 year period.

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

..... **[3]**

(ii) Using Fig. 5.1, calculate the percentage of species assessed that were threatened with extinction in **2010**.

Show your working. Give your answer to the **nearest whole number**.

Answer = ... % **[2]**

(iii) Suggest explanations for the shape of the two curves between **2005** and **2010**.

.....

.....

.....

.....

.....

..... **[2]**

© OCR 2013

(c) A study of the biodiversity of an area considers not only the total number of species but also the relative number of individuals within each species.

State **one** further factor that could be taken into account when describing the biodiversity of an area.

.....

..... **[1]**

(d) In any attempt to protect global biodiversity, cooperation between countries is important.

Two examples of such international cooperation are:

- Convention on International Trade in Endangered Species (CITES)
- Rio Convention on Biological Diversity.

Other than the conservation of biodiversity, state **two** aims for each of these conventions.

Convention on International Trade in Endangered Species .....

.....

.....

.....

.....

.....

Rio Convention on Biological Diversity .....

.....

.....

.....

.....

.....

[4]

[Total: 14]

© OCR 2013

BLANK PAGE

Question 6 begins on page 18

PLEASE DO NOT WRITE ON THIS PAGE

© OCR 2013

6 **(a)** Glucose is a hexose sugar and is a monomer in many carbohydrates.

Name the precise group of carbohydrate molecules of which glucose is an example.

..... **[1]**

(b) Fig. 6.1 represents the structure of a **β-glucose** molecule.

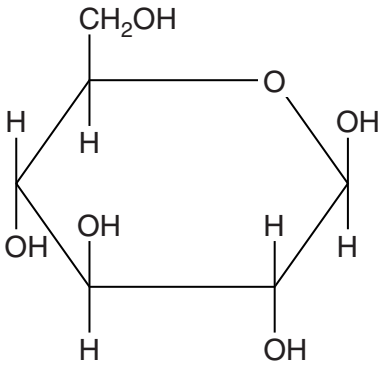


Fig. 6.1

(i) Use Fig. 6.1 to draw a similar representation of an **α-glucose** molecule in the space provided below.

[2]

(ii) The cells of living organisms require glucose.

State and explain **two** ways in which the glucose molecule is well suited to its function in living organisms.

.....

.....

.....

..... **[2]**

© OCR 2013

(c) Deoxyribose is a pentose sugar that is a component of the double-stranded DNA molecule.

Describe the structural relationship between deoxyribose and the other components of the DNA molecule.

.....

.....

.....

.....

.....

.....

..... **[3]**

(d) Cellulose is a carbohydrate.

A student described the structure of cellulose as follows:

> The cellulose molecule is insoluble.
> It contains only the elements carbon, hydrogen and oxygen.
> It is made up of α-glucose subunits.
> The glucose subunits are linked by 1-4 glycosidic bonds formed by hydrolysis reactions.
> It also has some 1-6 glycosidic bonds.
> It is made of many long chains.
> The chains have branches.

(i) Identify **three** mistakes made by the student when describing the structure of cellulose.

1 .....

.....

2 .....

.....

3 .....

.....

[3]

(ii) Suggest the name of a molecule that closely matches the student's description.

..... **[1]**

[Total: 12]

© OCR 2013

7 **(a)** Humans have been using microorganisms to make food for over 4000 years. Yoghurt is a dairy product that is produced by the action of microorganisms on milk.

Suggest why yoghurt production relies on a plentiful supply of plants.

.....

..... **[1]**

(b) Protein known as mycoprotein is promoted as a healthy alternative to meat. Mycoprotein is made using fungal microorganisms.

Discuss the advantages **and** disadvantages of using microorganisms to produce protein for human consumption.



In your answer you should consider a range of advantages and disadvantages.

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

© OCR 2013

.....

.....

.....

.....

..... **[8]**

(c) Microorganisms can also be responsible for food spoilage. In order to prevent this spoilage, a range of food preservation methods are used.

Complete the table below to explain how the **three** methods of food preservation reduce food spoilage.

Method	Explanation
Freezing	
Pickling	
Irradiation	

[3]

[Total: 12]

Question 8 begins on page 22

© OCR 2013

8 The table below shows some biological terms and descriptions that are used in topics on evolution, biodiversity and conservation.

Complete the table using the most appropriate terms or descriptions.

The first one has been done for you.

Biological Term	Description
Natural Selection	The theory proposed by Darwin on the evolution of species.
Speciation	
	Differences between individuals that cover a range of values rather than discrete categories.
Adaptation	
	A system of naming organisms that uses two scientific (Latin) names for species.
	The type of conservation of which seed banks are an example.
	A study carried out by a local planning authority in order to judge the effect of a development on the biodiversity of an area.

[6]

[Total: 6]

END OF QUESTION PAPER

© OCR 2013

ADDITIONAL ANSWER SPACE

If additional answer space is required, you should use the following lined page(s). The question number(s) must be clearly shown in the margins.

© OCR 2013

RECOGNISING ACHIEVEMENT

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 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 1GE.

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.

© OCR 2013