

**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




Candidate forename		Candidate surname	
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Centre number						Candidate number				
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**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.

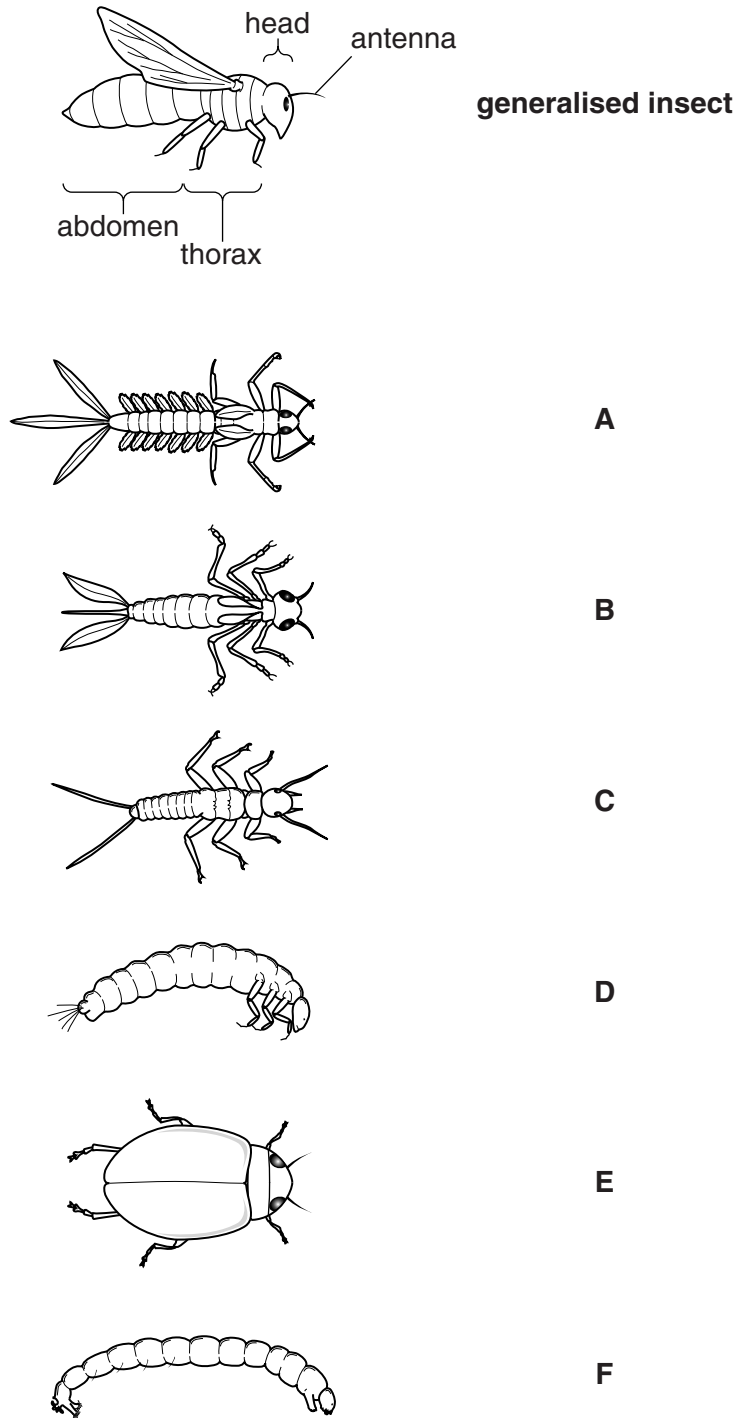
**INFORMATION FOR CANDIDATES**

- 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.

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**

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

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

**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]

(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]

5  
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**Question 2 begins on page 6**  
**PLEASE DO NOT WRITE ON THIS PAGE**

- 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]



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

.....  
.....  
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.....  
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.....  
..... [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 .....  
.....  
.....  
.....  
.....  
.....  
.....  
..... [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]



- (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**



(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**

- 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]

(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]

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.

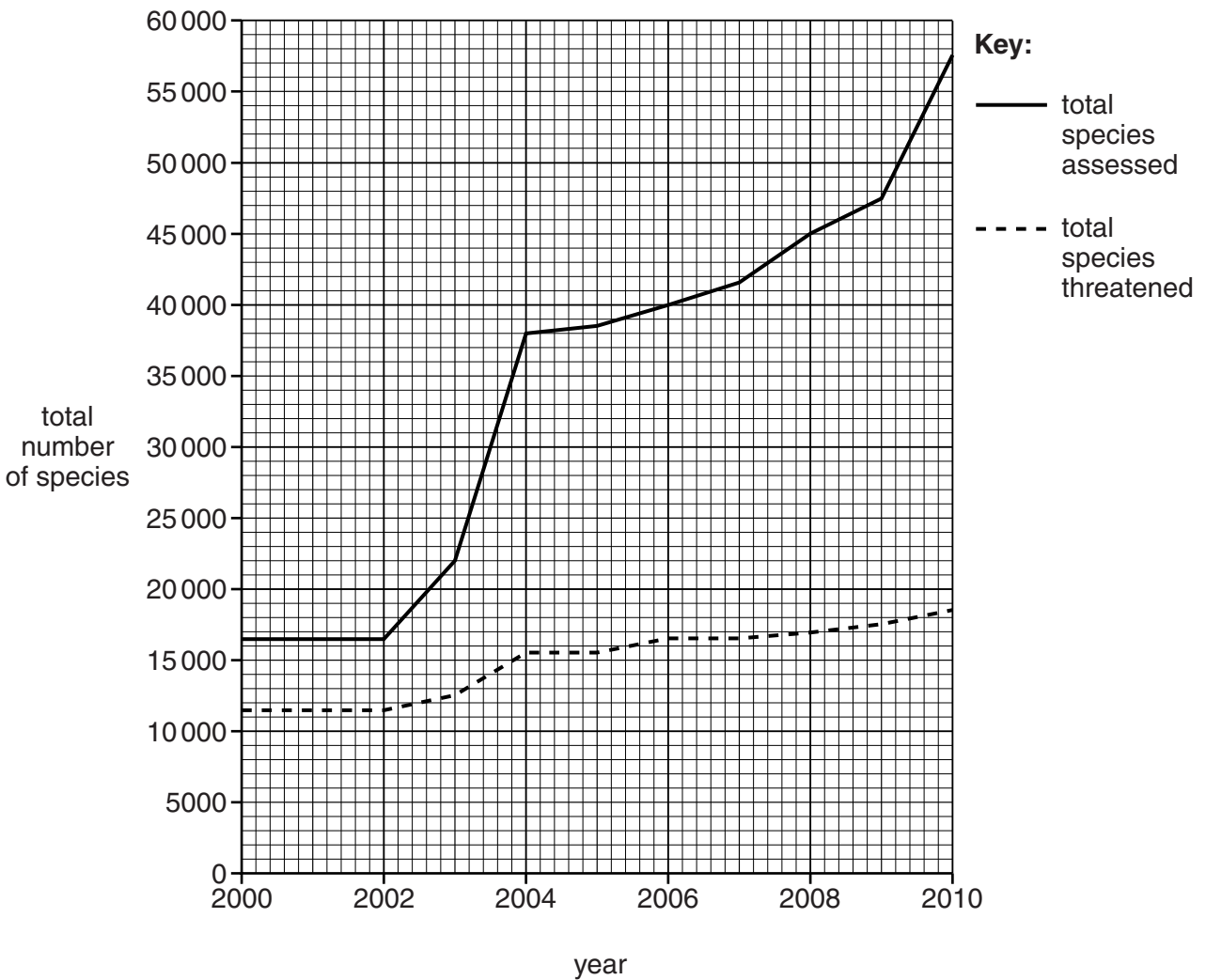


Fig. 5.1



(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]



17  
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**Question 6 begins on page 18**  
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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.

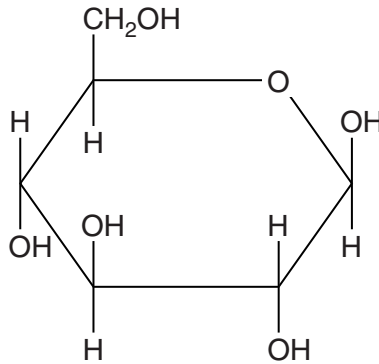


Fig. 6.1

(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]

(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  $\alpha$ -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]



.....

.....

.....

.....

.....

..... [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

- 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**

**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.

A large area of lined paper for writing answers. It features a vertical margin line on the left side and horizontal dotted lines for writing. The lines are evenly spaced and extend across the width of the page.

A large area of the page is reserved for writing, featuring a vertical solid line on the left side and horizontal dotted lines extending across the page.



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