

Tuesday 6 June 2017 – 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 page at the end of this booklet. The question number(s) must be clearly shown.
- Do **not** write in the barcodes.

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 **20** pages. Any blank pages are indicated.

Answer **all** the questions.

- 1 Until fairly recently, the standard scientific system of classification grouped organisms into five kingdoms.

Fig. 1.1 shows diagrams of two organisms from the kingdom Protocista.

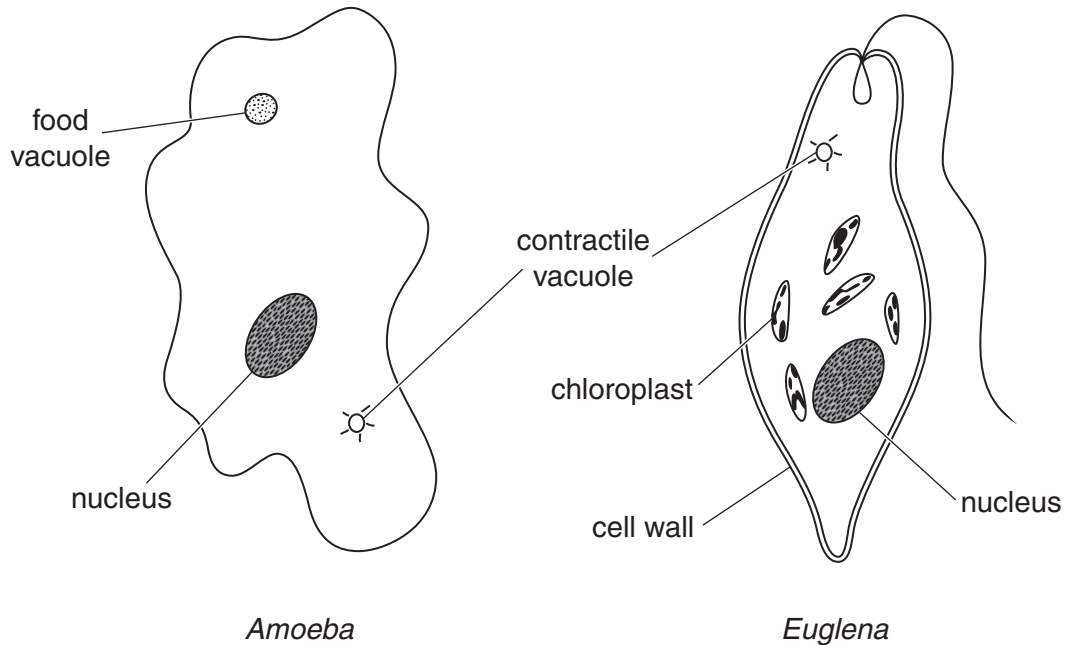


Fig. 1.1

- (a) (i) Using Fig. 1.1, suggest **one** reason why *Amoeba* and *Euglena* are classified in the same kingdom.

.....
 [1]

- (ii) In the past, *Amoeba* and *Euglena* were classified in different kingdoms.
 Use the information in Fig. 1.1 to suggest why.

.....

 [1]

- (iii) If the kingdom Protocista did not exist, suggest the kingdoms into which *Amoeba* and *Euglena* could best be classified.

Write your answers in the table below.

Organism	Kingdom
<i>Amoeba</i>	
<i>Euglena</i>	

[2]

- (b) (i) More recently, a new classification system was adopted, based upon three larger groupings: Archaea, Bacteria and Eukaryota.

State the name given to these larger groupings.

..... [1]

- (ii) Outline the reasons why this new system of classification was adopted.

.....

 [3]

- (c) The binomial name for humans is *Homo sapiens*.

Describe the rules for naming organisms using the binomial system.

.....

 [4]

- (d) Chimpanzees, gorillas and orang-utans used to be classified in the family Pongidae, while humans were in the family Hominidae.

Humans, chimpanzees, gorillas and orang-utans are now all classified in the family Hominidae.

Suggest what evidence a molecular biologist might use to justify this change in classification.

.....

.....

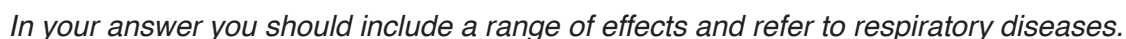
..... [1]

[Total: 13]

(a) Name **one** component of cigarette smoke that causes mutations.

..... [1]

Describe the **other** effects that smoking has on the gas exchange system.



[8]

[Total: 9]

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3 (a) Maltose is a carbohydrate molecule formed from two α -glucose molecules.

(i) State the **precise name** of the type of carbohydrate of which maltose is an example.

..... [1]

(ii) Name the covalent bond between the two glucose molecules in maltose and describe how it is formed.

bond

description of how it is formed

.....

 [5]

(iii) Name **one other** carbohydrate molecule that contains α -glucose.

..... [1]

(b) A student wanted to determine how much glucose is in a bottle of fruit drink.

As part of his procedure he heated a sample with Benedict's reagent. He observed the colour of the solution at the beginning and at the end of the procedure.

(i) Describe the colour **change** in a positive Benedict's test.

.....
 [1]

- (ii) Suggest why glucose causes the colour change seen in a positive Benedict's test.

.....
 [1]

- (iii) The student planned to use a colour comparison chart for Benedict's reagent to estimate the concentration of glucose. His teacher suggested he use a colorimeter instead.

Suggest **one** advantage of using a colorimeter and not a colour chart to estimate the concentration of glucose.

.....
 [1]

- (iv) The student carried out a Benedict's test on a series of glucose solutions of known concentration.

He removed the precipitate from each sample and used a colorimeter to measure the percentage transmission through the remaining liquid.

The student used the data to produce the graph shown in Fig. 3.1.

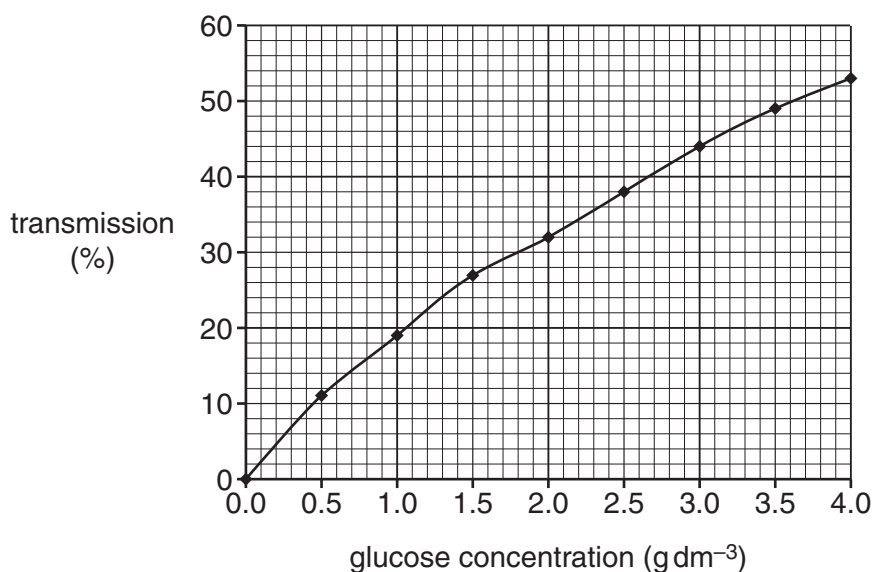


Fig. 3.1

His sample of fruit drink produced a transmission of 50%.

Use the graph to calculate the mass of glucose in a 250 cm^3 bottle of the drink.

Show your working.

Answer = g [2]

- (v) Suggest why the value calculated for the mass of glucose in the fruit drink might have been an overestimate.

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

- (c) Another student carried out the same procedure. When he used the colorimeter to measure the solution containing no glucose, the transmission was 47%.

The teacher told him he would have to subtract 47 from each colorimeter reading before plotting his graph.

- (i) Suggest **one other** way this student could modify his procedure to get a value of 0% transmission with a solution containing no glucose.

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

- (ii) Suggest **two** other ways the student could make sure his procedure produced **valid** results.

1
.....
2
.....
[2]

[Total: 17]

4 DNA and the enzyme DNA gyrase are two molecules found in living organisms.

- (a) (i) Suggest **one** way that the location of DNA is different in animal cells compared with bacterial cells.

.....
 [1]

- (ii) Complete the table below to show the differences between DNA and the enzyme DNA gyrase.

The first row has been completed for you.

	DNA	DNA gyrase
Elements present	<i>C, H, O, N, P</i>	<i>C, H, O, N, S</i>
Type of molecule		
Name of monomer		
Bonds which link monomers		

[3]

- (b) Fluoroquinolones are a type of antibiotic used to treat a range of diseases in humans.

As part of their antibacterial action, fluoroquinolones bind to DNA gyrase in bacterial cells.

Some bacteria are now resistant to fluoroquinolones following a mutation in the gene for DNA gyrase.

Suggest why a mutation in the gene for DNA gyrase means that fluoroquinolone may not bind to the DNA gyrase molecule.

.....

 [5]

(c) Antibiotics, such as fluoroquinolones, can be given to farm animals to increase food productivity.

(i) Suggest how antibiotics, such as fluoroquinolones, increase productivity in farm animals.

.....

.....

.....

.....

.....

..... [3]

(ii) Suggest why some health professionals are concerned about the widespread use of antibiotics in farm animals.

.....

..... [1]

[Total: 13]

- 5 The African elephant, *Loxodonta africana*, has tusks made of ivory.

Tusk length in the elephant population shows variation.

- (a) **Four** descriptions in the box below are most likely to apply to the type of variation shown by the tusks of African elephants.

One description has been ticked. Tick the **other three** correct descriptions.

Description	
Continuous	✓
Controlled only by few genes	
Discrete categories	
Discontinuous	
Intermediates present	
Polygenic	
Qualitative	
Quantitative	

[3]

- (b)** There is evidence that the mean length of tusks in the population has decreased over the last 150 years.

It is thought that the killing of elephants for their ivory has led to this reduction in mean tusk length.

Explain the mechanism which has led to this reduction in the length of tusks.

..... [6]

- (c) It is now illegal to kill elephants for their ivory.

Name **one** international agreement designed to monitor the illegal sale of ivory.

..... [1]

- (d) Suggest **three** measures that could help conserve the African elephant population *in situ*.

1

.....

2

.....

3

.....

[3]

[Total: 13]

6 This question is about antibodies and B lymphocytes.

(a) (i) Sketch a diagram of an antibody molecule and label the main **regions**.

[3]

Question 6(a)(ii) begins on page 14

- (iii) What is the benefit to the individual of antibodies being produced more quickly on the second occasion that the same antigen enters the body?

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

- (b) Complete the following passage using the most appropriate terms.

Antibodies are soluble and can be transported in blood plasma because they are proteins. Since water molecules are they are attracted to the R groups on the surface of the protein molecules. [3]

- (c) During pregnancy, antibodies are able to cross the placenta to provide immunity for the developing fetus.

- (i) Why is this type of immunity described as passive?

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

- (ii) State another term used to describe this type of immunity.

..... [1]

[Total: 15]

- 7 There is a link between coronary heart disease (CHD) and blood cholesterol.

Fig. 7.1 shows data about the risk of CHD and blood cholesterol concentration.

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Fig. 7.1

- (a) Using Fig. 7.1, describe the trend for women and compare it to the trend for men.

Trend for women

.....

Comparison with trend for men

.....

.....

.....

.....

[3]

- (b) Outline how cholesterol is thought to contribute to the development of CHD.

.....

.....

.....

.....

.....

.....

[3]

- (c) A newspaper claimed that the data shown in Fig. 7.1 proves that cholesterol causes CHD.

Suggest **three** reasons why the data in Fig. 7.1 might not fully support the newspaper's claim.

1

.....

2

.....

3

.....

[3]

[Total: 9]

Question 8 begins on page 18

8 Loss of biodiversity is causing concern worldwide.

(a) A student defined *biodiversity* as:

"the variety of species in a particular ecosystem".

(i) Define the term *species*.

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

(ii) Variety of species is one level of biodiversity.

State **two** other levels of biodiversity.

1
2 [2]

(b) Outline why maintaining biodiversity might be important to a company that manufactures drugs.

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

(c) Outline the potential benefits **to agriculture** of maintaining biodiversity.

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

- (d) Global climate change could mean that certain crops can grow in new areas.

Suggest why these crops might be at a bigger risk from disease.

.....

.....

.....

.....

..... [2]

[Total: 11]

END OF QUESTION PAPER

This image shows a blank sheet of white paper designed for writing. It features a series of evenly spaced horizontal blue lines across its entire width. A single vertical red line runs down the left side, creating a narrow margin. The paper is otherwise empty, with no text or markings.

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