Centre No.						Paper Reference							Surname	Initial(s)
Candidate No.						6	1	0	6	/	0	3	Signature	

Paper Reference(s)

6106/03

Examiner's use only

Team Leader's use only

Edexcel GCE

Biology

Biology (Human)

Advanced

Unit Test 6 Paper 03 Synoptic Paper

Friday 23 June 2006 – Afternoon

Time: 1 hour 10 minutes

Question Number	Leave Blank
1	
2	
3	
4B	
5H	

Materials required for examination
Ruler

Items included with question papers
Nil

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 Questions 1 and 2 and then *either* Question 3 *or either* 4B *or* 5H in the spaces provided in this question paper.
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 paper is 38.
There are 20 pages in this question paper. All blank pages are indicated.

Advice to Candidates

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.
This question paper 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.

Total

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Answer Questions 1 and 2 in the spaces provided.

1. (a) Explain why haemoglobin is an efficient respiratory pigment.

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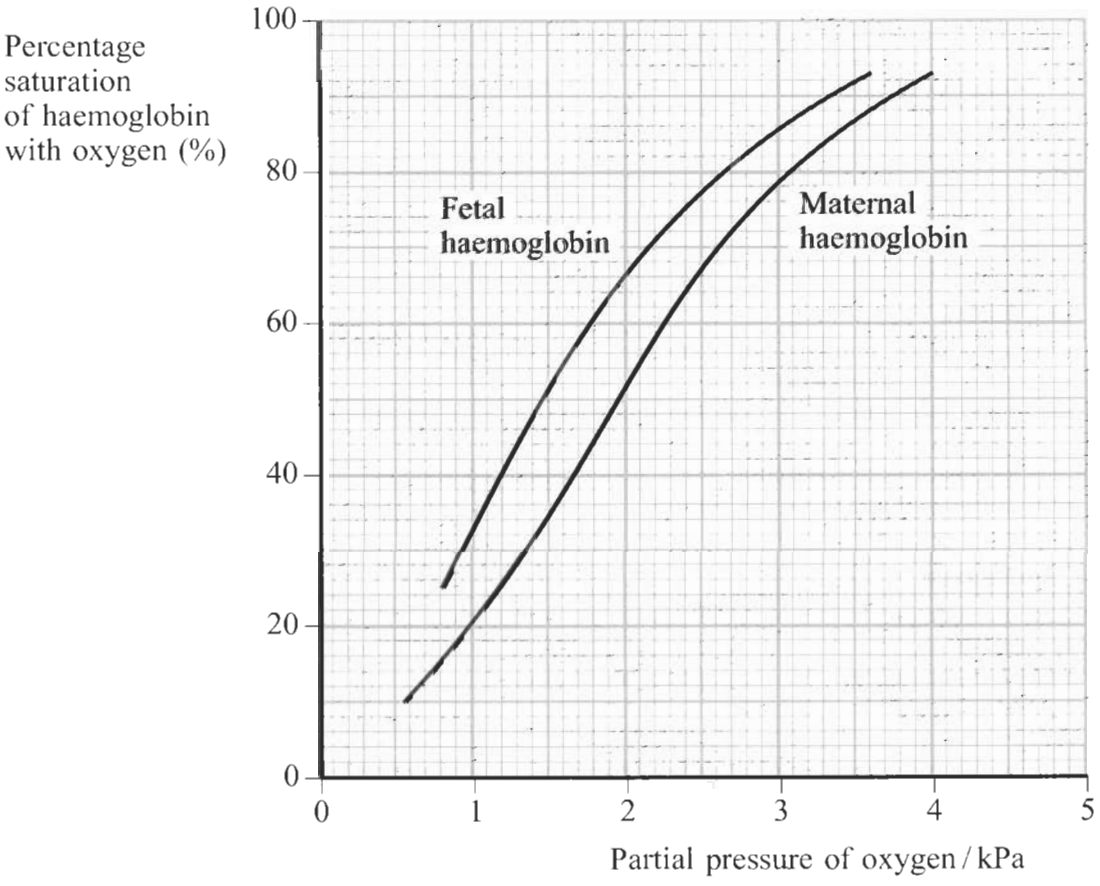
(2)

(b) The graph below shows oxygen dissociation curves for fetal and maternal haemoglobin from a goat.



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(i) The partial pressure of oxygen at which haemoglobin is 50% saturated with oxygen is referred to as the half-saturation pressure (P_{50}). From the graph, determine the half-saturation pressure for fetal and for maternal haemoglobin.

Fetal haemoglobin ..... kPa

Maternal haemoglobin ..... kPa

(1)

(ii) Suggest why it is important that the dissociation curve for fetal haemoglobin is to the left of the dissociation curve for maternal haemoglobin.

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(3)

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(c) Soon after most babies are born, their fetal haemoglobin is replaced with adult haemoglobin. However, a mutation sometimes occurs which results in a condition known as hereditary persistence of fetal haemoglobin (HPFH). Carriers of HPFH have the genotype $\mathbf{Hb^bHb^f}$. A person affected with HPFH has the genotype $\mathbf{Hb^fHb^f}$.

In the space below, draw a genetic diagram to find the probability that a baby, born to parents who are both carriers for HPFH, will also be a carrier.

(3) **Q1**

(Total 9 marks)

Leave blank

2. Extensive field trials have been carried out to assess the environmental effects of growing genetically modified (GM) crop plants, such as maize and oilseed rape. The crop plants have been genetically modified so that they are resistant (tolerant) to certain herbicides.

Each crop was planted in a number of different sites. Each site was divided into two. One half of each site was planted with a non-genetically modified (non-GM) crop and the other half was planted with the genetically modified crop.

The crops were grown for three years and during this time many different measurements were made. Measurements included the density of weeds in the crops and the numbers and types of invertebrates, such as predatory insects, living on and in the soil.

(a) Explain what is meant by the term **genetically modified organism** (GMO).

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(2)

(b) Suggest why predatory insects, such as hoverfly larvae and ladybirds, may be beneficial to crop plants.

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(2)

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(c) Many of the insects present are herbivores or decomposers. Suggest why each of these groups of insects is important in terrestrial food chains.

Herbivores .....

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Decomposers .....

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(3)

(d) Some of the results of these field trials are summarised in the table below.

Factor	GM maize compared with non-GM maize	GM oilseed rape compared with non-GM oilseed rape
Weed density	Increase	Decrease
Number of weed seeds in soil	No change	Decrease
Number of invertebrates on soil surface	Increase	Decrease

(i) Describe a method which could be used to determine the density of weeds in each crop.

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(4)

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(ii) Using the evidence in the table, state which genetically modified crop seemed to be less harmful to the environment and give an explanation for your answer.

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(2)

(e) Suggest **one** environmental disadvantage of growing herbicide-tolerant GM maize compared with non-GM maize.

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(1) **Q2**

(Total 14 marks)

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Write an essay on ONE of the following topics.

Put a cross in the box below indicating the question you have chosen (☒). If you change your mind, put a line through the box (☒) and then put a cross in the other box (☒).

Chosen question number: **Question 3** ☐

Question 4B ☐

Question 5H ☐

For Biology you should choose EITHER Question 3 OR Question 4B.

3. The transport of molecules and ions through the cell surface membrane.

(15 marks)

4B. The detection of light by mammals and flowering plants.

(15 marks)

For Biology (Human) you should choose EITHER Question 3 OR Question 5H.

3. The transport of molecules and ions through the cell surface membrane.

(15 marks)

5H. The production of gametes, fertilisation and the detection of fetal abnormality by amniocentesis.

(15 marks)

Marks will be awarded for scientific content, coverage of the topic, and the quality of written communication. You should include in your answers any relevant information from the whole of your course. You may include diagrams if you wish, but make sure that they are relevant to your essay and add extra information to it.

Write your answer, including any plan, here.

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(Total 15 marks)

TOTAL FOR PAPER: 38 MARKS

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