Centre No.						Paper Reference							Surname	Initial(s)
Candidate No.						6	1	0	5	/	0	1	Signature	

Paper Reference(s)

6105/01

Edexcel GCE

Biology

Advanced

Unit 5B

Wednesday 23 January 2008 – Morning

Time: 1 hour 30 minutes

Examiner's use only

Team Leader's use only

Question Number	Leave Blank
1	
2	
3	
4	
5	
6	
7	
Total	

Materials required for examination
Nil

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 ALL questions. Write your answers 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)**.
There are 7 questions in this question paper. The total mark for this question paper is 70.

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.
The Synoptic section (Questions 4 to 7) 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.

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Answer ALL questions in the spaces provided.

1. The white tobacco fly (*Bemesia tabaci*) is a pest of many plants, especially glasshouse crops. It is found in Southern Europe, although there have been hundreds of outbreaks in England in recent years.

Biologists studying this pest believe the species is undergoing evolutionary change. They have identified two strains, Biotype A and Biotype B. Biotype B flies grow more quickly than Biotype A flies. Biotype B flies are becoming more resistant to insecticides.

(a) Using the information provided above, state which of the two biotypes, A or B, is a more serious pest.

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(1)

(b) The two biotypes of white tobacco fly live in the same areas. Explain how the white tobacco fly could evolve into two species.

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(4)

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(c) The white tobacco fly is found in glasshouses. Explain why biological control would be more suitable for controlling this pest than the use of insecticides.

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(3) **Q1**

(Total 8 marks)

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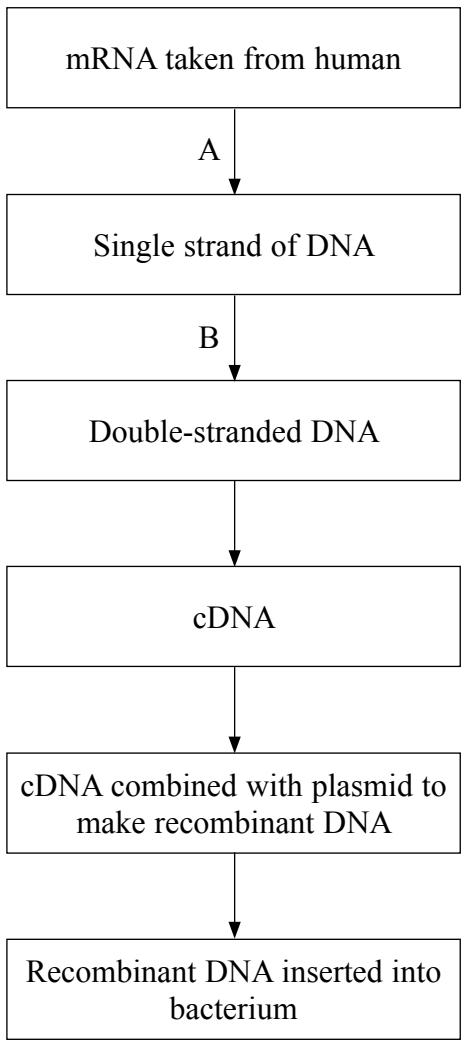
2. The flow diagram below shows how a genetically modified organism may be produced by inserting a human gene into a bacterium.



(a) Name the enzymes identified as A and B on the flow diagram.

A .....

B .....

(2)

Leave blank

(b) Describe how the cDNA and the plasmid could be combined together.

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(3)

(c) Not all the bacteria would be successfully modified. Describe **one** method that could be used to identify the modified bacteria.

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(2)

Q2

(Total 7 marks)

Leave blank

3. The ABO blood group system in humans is an example of multiple allele inheritance. Using this system, human blood can be classified into four possible blood groups: A, B, AB and O. The blood group of a particular individual is determined by a single gene pair.

(a) With reference to the inheritance of blood group in the ABO system, explain each of the following terms.

(i) Codominance

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(2)

(ii) Multiple allele inheritance

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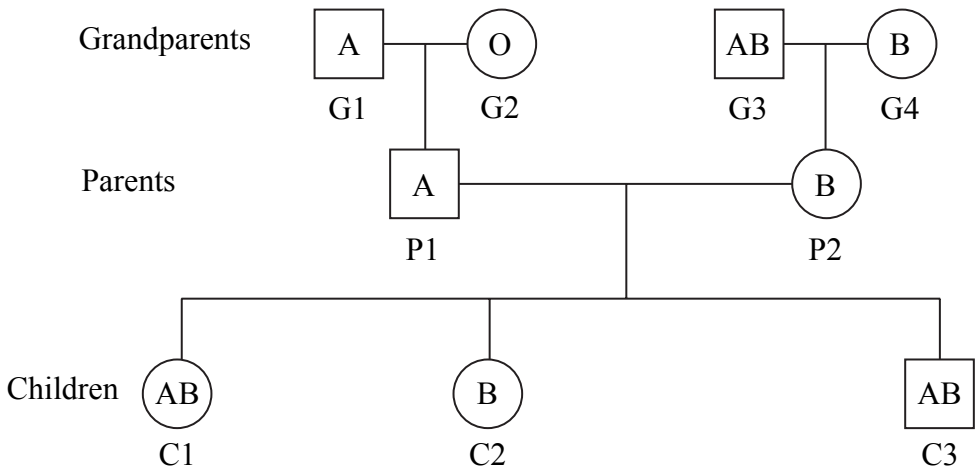
(2)

Leave blank

(b) The family tree for a couple (P1 and P2) with three children is shown in the diagram below. The grandparents of the children and the blood group for each individual are also shown.



(i) State the genotype of each of the children.

C1 .....

C2 .....

C3 .....

(1)

(ii) There is a chance that the next child born to this couple will have group O blood. Use a genetic diagram to explain this.

(4) **Q3**

(Total 9 marks)

Leave blank

Synoptic Section

The questions in this section are 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.

4. The table below shows the fresh biomass of green plants and consumers on an area of grassland.

Organism	Fresh biomass / g
Green plants	2250.0
Primary consumers	240.0
Secondary consumers	38.0

(a) (i) Calculate the percentage loss in fresh biomass between the green plants and the primary consumers. Show your working.

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(2)

(ii) Give **two** reasons to explain the loss in biomass between the primary and secondary consumers.

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(2)

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(b) Only a small percentage of the light energy that falls on the green plants is used in photosynthesis. Explain why blue and red light would be more useful to a plant than green light.

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(3)

(c) Explain how acid rain could lead to a decline in the biomass of green plants growing on the grassland.

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(4)

(Total 11 marks)

Q4

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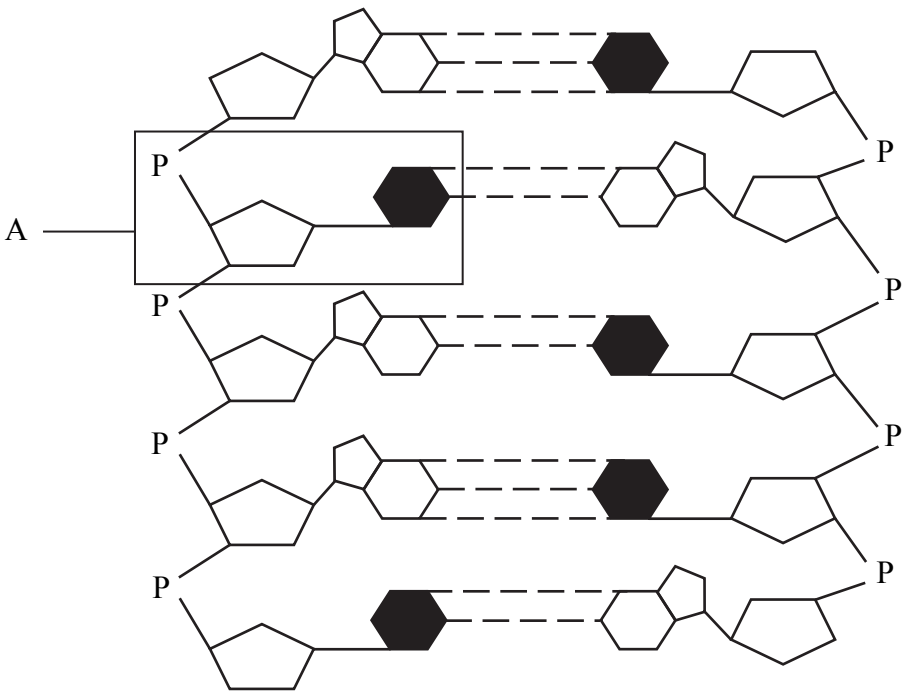
5. The diagram below shows part of a DNA molecule.



(a) (i) State the term used to describe the part of the molecule enclosed by the box labelled A.

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(1)

(ii) Name the molecular components shown in this box.

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(2)

Leave blank

(b) DNA must replicate if genetic information is to be passed on during mitosis and meiosis.

(i) State the phase of the cell cycle in which DNA replicates.

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(1)

(ii) Explain why DNA replication is described as being semi-conservative.

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(2)

(iii) Describe the role of DNA polymerase during DNA replication.

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(2)

(c) Explain why mitosis leads to the formation of genetically identical daughter cells but meiosis gives genetically variable daughter cells.

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(4)

Q5

(Total 12 marks)

Leave blank

6. (a) (i) In the space below, draw a diagram of a synapse. On your drawing label the following structures: pre-synaptic membrane, post-synaptic membrane, synaptic vesicles and mitochondria.

(3)

(ii) Explain the functions of the mitochondria and the synaptic vesicles.

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(3)

Leave blank

(b) The effects of nicotine from cigarette smoke can be felt in the body within 15 to 30 seconds of inhaling it. Describe how nicotine in cigarette smoke can enter the body and reach the synapse. Explain the effect of nicotine on the synapse.

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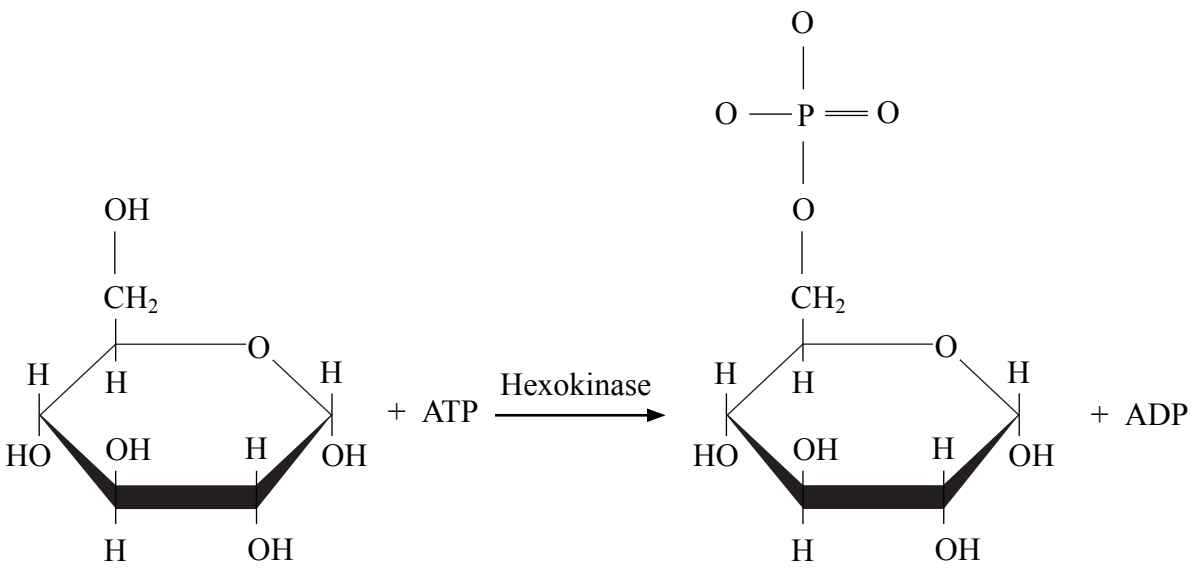
(6)

Q6

(Total 12 marks)

Leave blank

7. In the first reaction of glycolysis, a phosphate group from an ATP molecule is transferred to the oxygen at the carbon-6 of glucose. Glucose-6-phosphate and ADP are produced. The diagram below shows a summary of this process.



Glucose

Glucose-6-phosphate

(a) State which form of glucose is shown in the diagram.

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(1)

(b) Explain why the phosphorylation of glucose by ATP, shown in the diagram above, allows the reactions of glycolysis to continue.

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(2)

(c) State the final products of glycolysis.

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(2)

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The transfer of the phosphate group is catalysed by the enzyme hexokinase. As glucose-6-phosphate concentration increases, it acts as a non-active site-directed inhibitor of hexokinase. The diffusion of glucose into a cell is regulated as a result of this inhibition.

(d) (i) Suggest how an increase in the concentration of glucose-6-phosphate leads to increased inhibition of hexokinase.

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(3)

(ii) Suggest why the inhibition of hexokinase regulates the diffusion of glucose into a cell.

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(3)

Q7

(Total 11 marks)

TOTAL FOR PAPER: 70 MARKS

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