Centre No.					Pape	er Refer	ence			Surname	Initial(s)
Candidate No.			6	1	0	5	/	0	1	Signature	

Paner Reference(s)

6105/01 Edexcel GCE

Biology

Advanced

Unit 5B

Wednesday 24 January 2007 - Morning

Time: 1 hour 30 minutes

Materials required for examination	Items included with question paper
Ruler	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 SEVEN questions in the spaces provided in this booklet.

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 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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Turn over

Total

Examiner's use only

Team Leader's use only

Question Number

1

2

3

4

5

6



Answer ALL questions in the spaces provided.

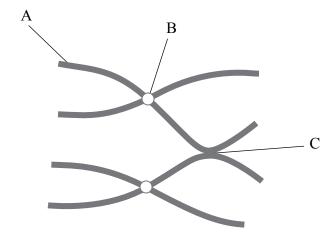
1. The table below refers to plant growth substances and their functions. Complete the table by inserting the correct word or words in the spaces provided.

Plant growth substance	One function
	Used in weed killers
Gibberellin	
Cytokinin	
	Involved in leaf fall
Ethene	

Q1

(Total 5 marks)

2. The diagram below shows a pair of homologous chromosomes (a bivalent) during meiosis.



(a) (i) Name **one** stage of meiosis during which homologous chromosomes might look like the ones shown in the diagram.

(1)

(ii) Name the structures labelled A, B and C on the diagram.

A

B

C

(2)

Leave	
blank	

	a breeding experiment, a homozygous black, rough-furred guinea pig was crosse h a homozygous white, smooth-furred guinea pig. This cross was repeated sever
tim	es to give offspring in the F_1 generation.
(i)	State the genotype and the phenotype of the F_1 generation.
(ii)	Several of the offspring in the F_1 generation were interbred to produce an generation.
	The phenotypes present in the F_2 generation are shown below. Give the expecteration of the different phenotypes in the F_2 generation by writing appropriation numbers in the spaces below.
	Black with rough fur =
	Black with rough fur = Black with smooth fur =

Leave	
hlank	

(iii) The numbers of the different phenotypes in the offspring in the F_2 generation produced as a result of interbreeding are given in the table below.

Phenotypes	Number
Black with rough fur	31
Black with smooth fur	4
White with rough fur	2
White with smooth fur	11

With reference to the expected ratio of phenotypes in the F_2 generation, suggest an explanation for the results shown in the table above.
(4)
(Total 9 marks)

(i) In the space below, draw a low power plan of a cross-section through a typical	al
dicotyledonous leaf, to show the distribution of the tissues. On your plan labe the palisade mesophyll, the spongy mesophyll and the lower epidermis. Do no include any cells.	el
(5	5)
(ii) Explain the role, in the process of photosynthesis, of each of the tissues you have	
(ii) Explain the role, in the process of photosynthesis, of each of the tissues you have	
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(ii) Explain the role, in the process of photosynthesis, of each of the tissues you have labelled in (a)(i).	
(ii) Explain the role, in the process of photosynthesis, of each of the tissues you have labelled in (a)(i).	
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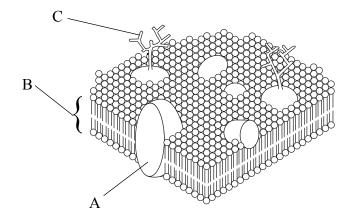
				(2) (Total 10 marks)		that you have drawn in (a)(i).	
(Total 10 marks)	(Total 10 marks)						
							(Total 10 marks
							(Total 10 marks

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 diagram below shows part of a cell surface membrane.



(a) (i) Name the parts labelled $\bf A$ and $\bf B$.

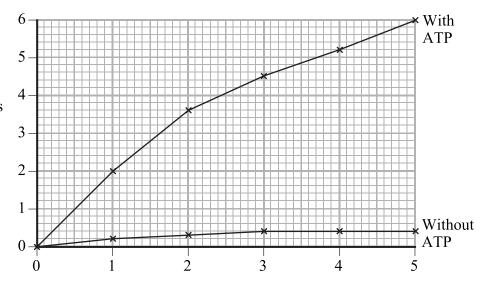
	A
	B(1)
(ii)	Name the molecule labelled C and state its role.
	Molecule C:
	Role
	(2)

(b) Cell surface membranes can fragment forming small pieces. These small pieces curl in on themselves to form membrane-bound vesicles filled with liquid.

In an experiment, the vesicles were immersed in a solution of sodium chloride in a water bath kept at 23 °C. The concentration of sodium ions in the liquid inside the vesicles was measured over a period of five minutes.

The procedure was repeated with ATP added to the sodium chloride solution. The results of this experiment are shown in the graph below.

Concentration of sodium ions inside the vesicles / arbitrary units

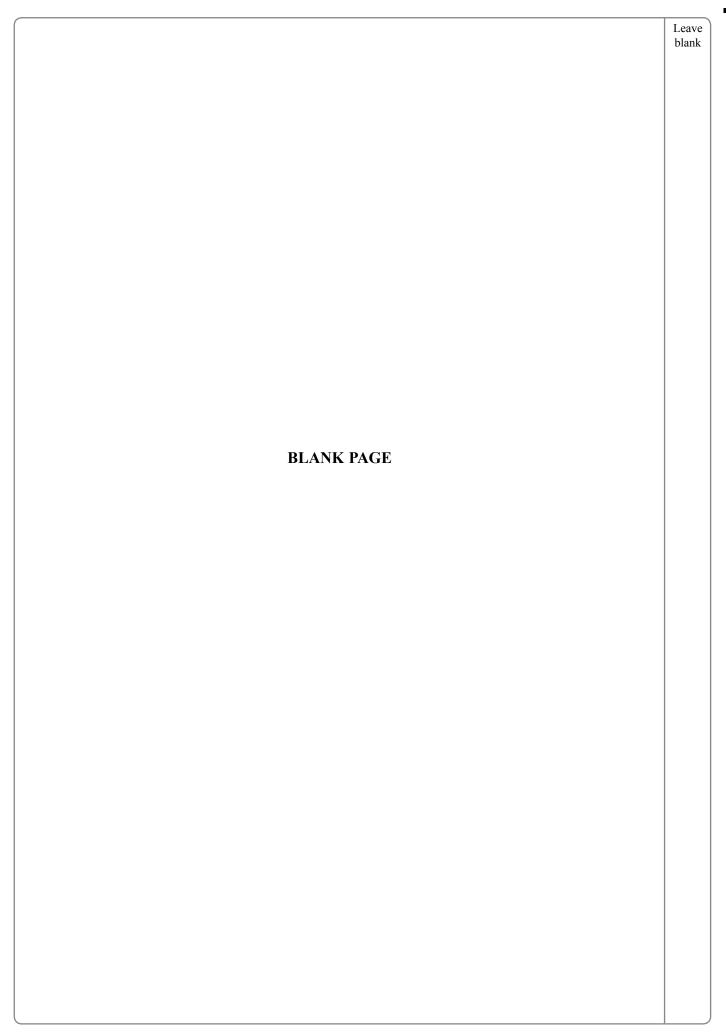


Time/minutes

(i)	Using the information in the graph, suggest how sodium ions are transported
	across the cell surface membrane into the liquid in the vesicles.

(4)

(ii) The loop of Henlé is part of a renal (kidney) nephron. Explain the role of sodium and chloride ion transport in the loop of Henlé.	Leave blank
(4) (Total 11 marks)	Q4





5. The water flea, *Daphnia*, is a type of aquatic invertebrate found in fresh water. An investigation was carried out to determine the effect of different concentrations of caffeine on the heart rate of *Daphnia*. After being kept at a temperature of 25 °C, individual *Daphnia* were placed on microscope slides in a few drops of caffeine solution. After one minute, the heart rate of each *Daphnia* was counted. This procedure was repeated ten times for each concentration of caffeine to obtain a mean heart rate. The results are shown in the table below.

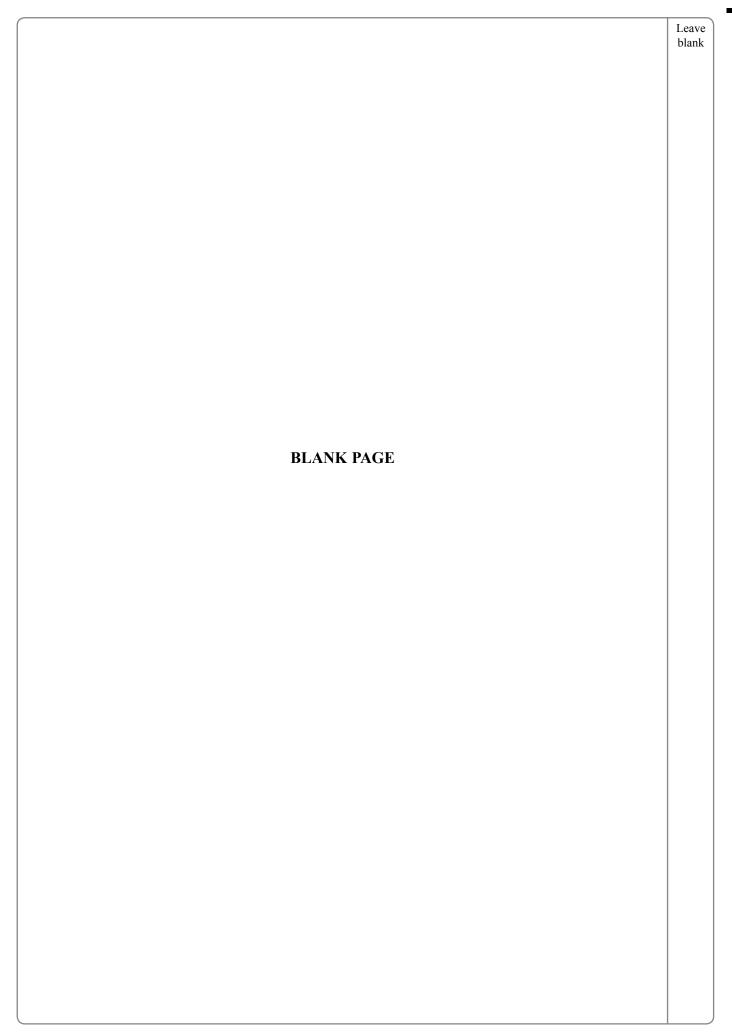
Concentration of caffeine / parts per million	Mean heart rate / beats per second
1000	5.6
100	4.9
10	4.4
1	4.1
0.1	4.0
0.01	3.9
0.001	3.8
0.0001	3.7
0.00001	3.7
0.0 (control)	3.7

Data adapted from R. Foster JBE 4,31

(a) (i)	Describe the relationship between mean heart rate and caffeine concentration	1.
		(3)

()	Calculate the percentage increase in the mean heart rate between the control the solution containing 1000 parts per million of caffeine. Show your working	
		υ
	Answer	. %
		(2)
L Darr	1	
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 (2)
(Total 11 marks)





Leave blank The diagram below shows a summary of the breakdown of starch in the human digestive system. Starch Disaccharide X Glucose (a) Identify disaccharide X and explain how it is converted into glucose in the ileum. **(3)** (b) Describe three features of the ileum which enable it to absorb glucose efficiently. **(3)**

(6
(Total 12 marks)

7. An area of abandoned grassland was studied over a period of more than 100 years. During that time, there were changes to the plant communities which resulted in changes to the number of species and population density of small birds. The table below shows the changes.

Time since abandoned / years	1–10	10–25	25–100	100+
Plant community	Grass	Shrubs	Pine trees	Mixed woodland
Number of species of small birds	2	8	15	19
Population density of small birds / number of birds per 40 hectares	54	246	226	466

					(1)
(a)	State the name that	is given to the	process by which	communities chang	ge over time.

	TOTAL FOR PAPER: 70 MARKS
	(Total 12 marks)
	(4)
l)	The mixed woodland is the final climax community. Describe and explain two ways in which woodland can be damaged by human activities.
	(2)