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

Paper Reference(s)

6BI05/1

Edexcel GCE

Biology

Unit 5: Energy, Exercise & Coordination

Sample Assessment Material

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	
8	
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 the questions. Write your answers in the spaces provided in this question paper.
Do not use pencil. Use black or blue ink.
Some questions must be answered with a cross in a box (☒). If you change your mind, put a line through the box (☒) and then mark your new answer with a cross (☒).

Information for Candidates

The marks for individual questions and the parts of questions are shown in round brackets: e.g. **(2)**.
There are 8 questions in this question paper. The total mark for this paper is 90.
There are 24 pages in this question paper. Any 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, including your use of grammar, punctuation and spelling.
Answers should be given in a correct biological context.

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Turn over

edexcel
advancing learning, changing lives

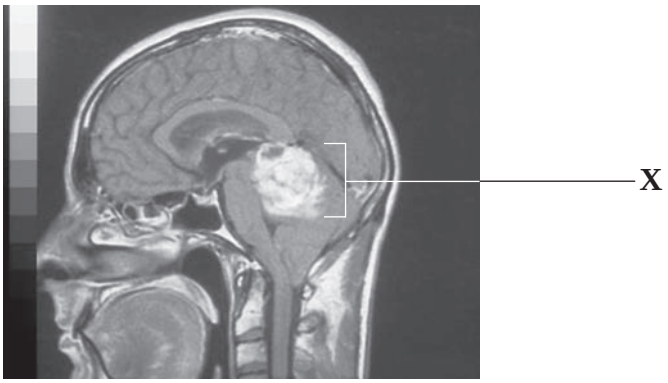
Leave blank

1. (a) The table below refers to three functions of the human brain. Complete the table to show which region of the brain is responsible for each function.

Function	Region of the brain
Ability to learn	
Thermoregulation	
Control of heartbeat	

(3)

(b) The diagram below shows an image produced by an MRI (magnetic resonance imaging) scan. The region labelled **X** is a tumour.



Source: www.medicalprogress.org

Suggest **two** pieces of information this scan could give to a surgeon about this tumour.

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(2)

Q1

(Total 5 marks)

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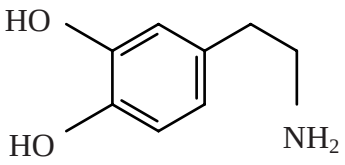
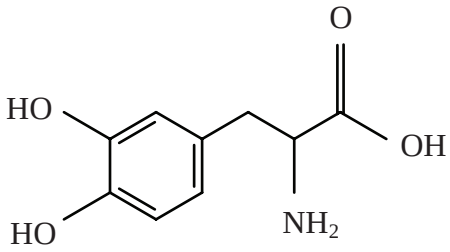
2. The diagram below shows the structures of the neurotransmitter, dopamine, and the drug, L-dopa, used in the treatment of Parkinson's disease.



Dopamine



L-Dopa

(a) With reference to the structures of dopamine and L-dopa, suggest why the drug L-dopa is effective in the treatment of Parkinson's disease.

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(4)

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(b) Scientists believe that the release of dopamine from the presynaptic membrane is triggered by certain emotional responses. Describe how the release of this neurotransmitter generates action potentials in the postsynaptic neurone.

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(5) **Q2**

(Total 9 marks)

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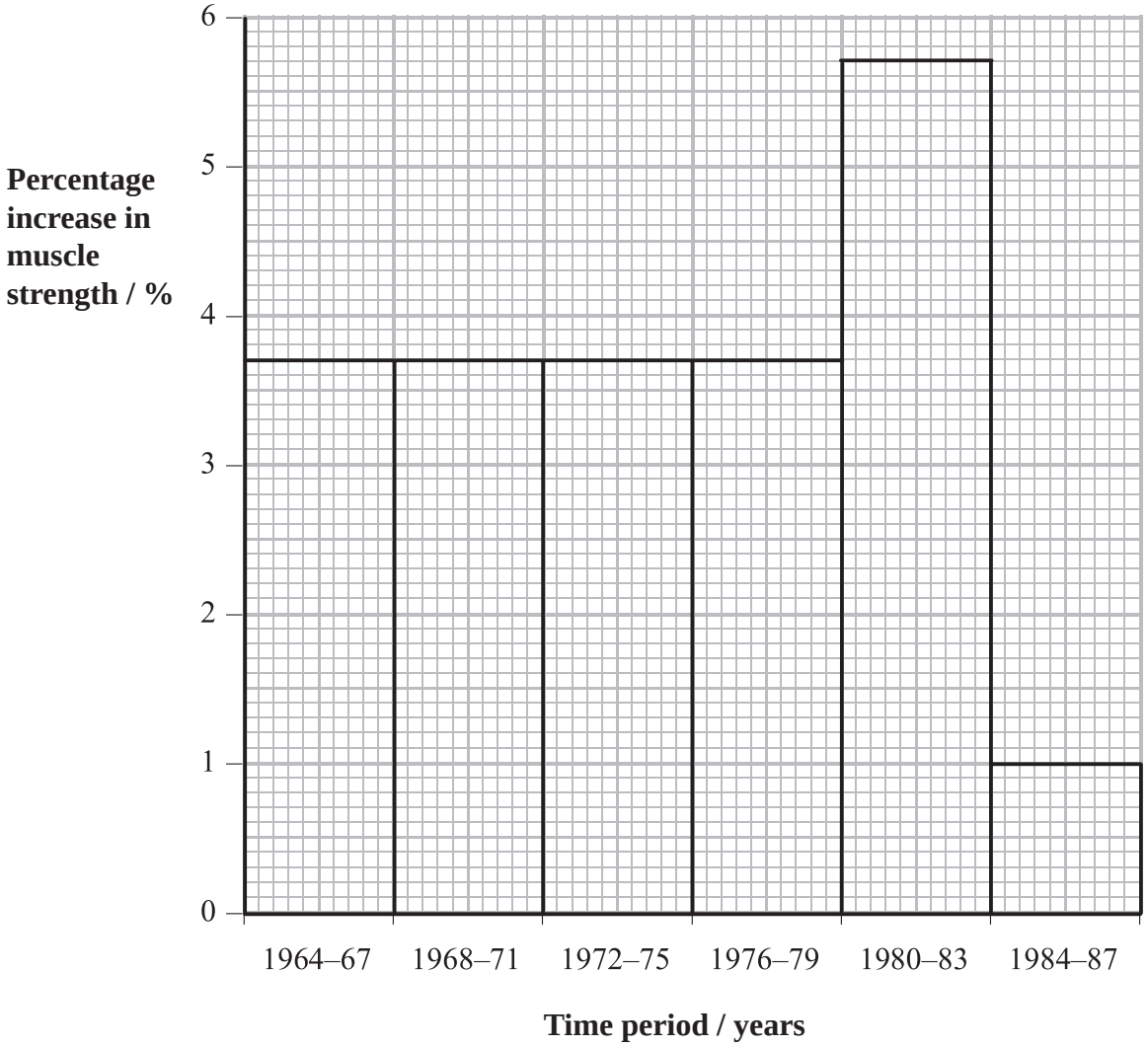
3. Olympic weight-lifters carry out intense training to increase their muscle strength. The muscle strength of weight-lifters increased over the period 1964 to 1987. The graph below shows the **percentage increase** in muscle strength in each four-year period, between 1964 and 1987.



(a) Describe the changes that have occurred in the muscle strength of these weight-lifters over this time period.

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(2)

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(b) It has been suggested that changes in muscle strength could be a result of performance-enhancing drugs.

Suggest possible reasons for the changes that occurred in the muscle strength of weight-lifters during the period 1980–1987.

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(3)

(c) Many people feel that the use of performance-enhancing drugs in sport is unethical. State whether you consider the use of performance-enhancing drugs in sport to be unethical. Give **two** ethical arguments to support your opinion.

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(2)

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(d) It is sometimes claimed that outstanding athletes are born and not made. Explain whether you agree with this view.

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(3)

Q3

(Total 10 marks)

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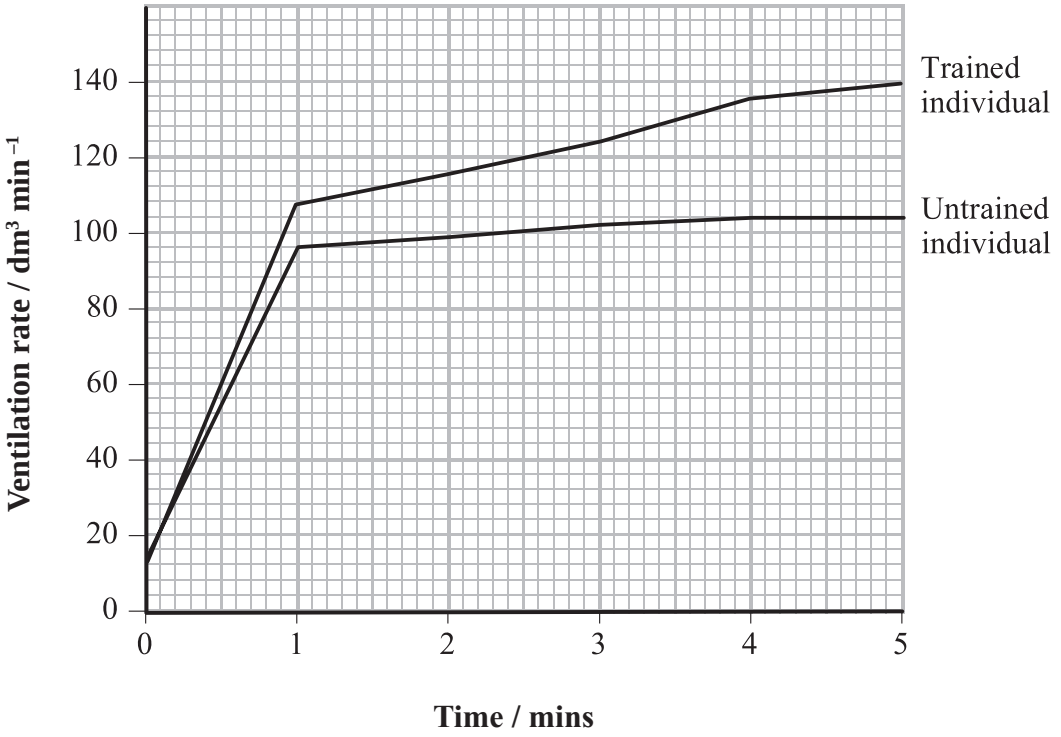
4. (a) A study was carried out to investigate the effects of training on the ventilation rate of the lungs during excercise. The graph below shows the effect of a five minute period of exercise on the ventilation rate of two individuals. One individual has followed a training programme and the other individual has not.



(i) Compare the effects of this exercise on the ventilation rate of the two individuals.

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(2)

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(ii) Suggest what other information would be needed to allow a valid comparison to be made of the effect of a training programme on ventilation rate.

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(3)

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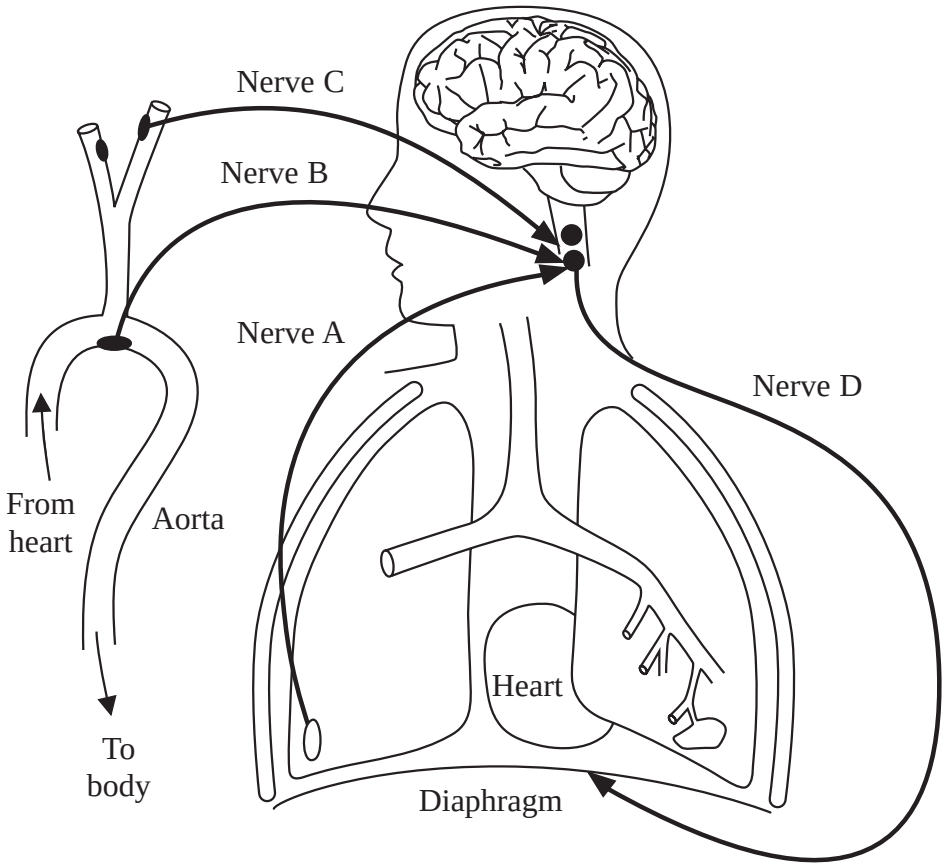
(b) An athlete was having difficulties with the control of his ventilation rate.
The diagram below shows four nerves labelled **A**, **B**, **C** and **D** involved in the control of ventilation.



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Damage to any of these four nerves would affect the control of ventilation. For each of the descriptions below, state which of the nerves labelled **A**, **B**, **C** or **D** would have been damaged. Put a cross in the box corresponding to the correct letter.

(i) Nerve impulses from the aortic body would not reach the respiratory centre.

A ☒ **B** ☒ **C** ☒ **D** ☒

(ii) Nerve impulses from the respiratory centre would not reach the diaphragm.

A ☒ **B** ☒ **C** ☒ **D** ☒

(iii) Nerve impulses would not reach the respiratory centre from the stretch receptors.

A ☒ **B** ☒ **C** ☒ **D** ☒

(iv) Nerve impulses from the carotid body would not reach the respiratory centre.

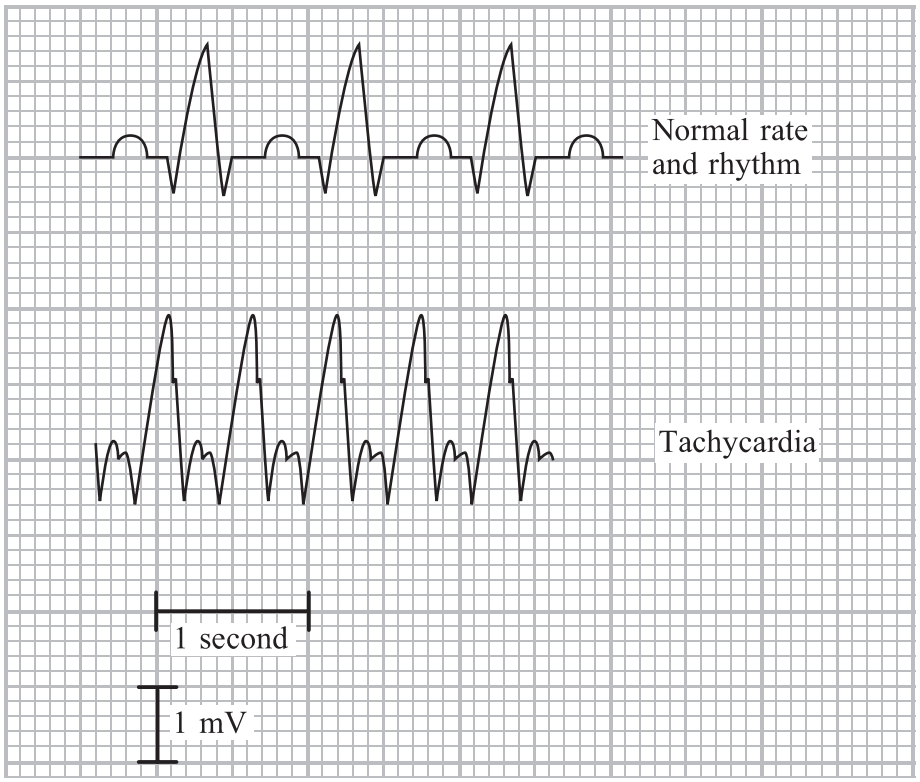
A ☒ **B** ☒ **C** ☒ **D** ☒

(4) **Q4**

(Total 9 marks)

Leave blank

5. Tachycardia is a heart condition in which the heart beats very rapidly, even when the patient is at rest. The diagram below shows part of two electrocardiograms (ECGs), one from a person with a normal heart beat and one from a patient with tachycardia.



(a) Describe the normal electrical activity that occurs in the heart during one complete heart beat.

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(4)

Leave blank

(b) Calculate the heart rate of the person with a normal heart beat, using the information in the ECG. Show your working.

Answer .....

(2)

(c) Compare the ECG of the person with a normal heartbeat with the ECG of the patient with tachycardia.

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(2)

(d) Suggest what effects tachycardia could have on cardiac output. Explain your answer.

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(3)

(Total 11 marks)

Q5

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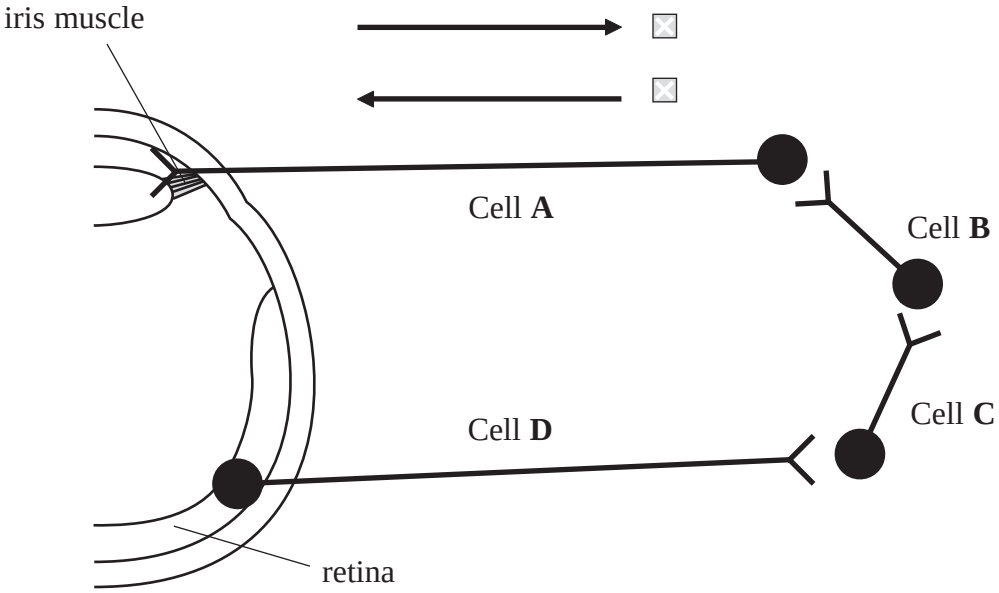
6. The retina of a mammal's eye contains millions of receptor cells which are highly sensitive to light. These receptor cells are protected from excessively bright light by the iris.
The diagram below shows part of a nerve cell pathway involved in the reflex controlling the size of the pupil by the iris.

(a) (i) Put a cross in the box next to the arrow that correctly shows the direction of impulse travel in cell **A**.



(1)

(ii) Identify the type of neurone for cell **A** and cell **B** by putting a cross in the correct box in the table below.

	Relay neurone	**Motor neurone**	**Sensory neurone**
Cell **A**	☒	☒	☒
Cell **B**	☒	☒	☒

(2)

(b) (i) Complete the equation below to show the chemical changes in rhodopsin in the presence of light.

rhodopsin + light → opsin + ...

(1)

Leave blank

(ii) Describe the movement of sodium ions across the rod cell membrane, in the presence of opsin.

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(3)

(iii) State the term that describes the electrochemical state of a rod cell in light.

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(1)

Q6

(Total 8 marks)

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7. Sea slugs are marine invertebrates with gills for gas exchange on their body surface. A sea slug is able to withdraw its gill when touched. In an investigation into this response, the gill was touched and the time taken for the gill to be exposed again after withdrawal was measured. This was repeated at half-minute intervals. The table below shows the results of this investigation.

Touch	Time taken for gill to be exposed again / seconds
First	23.0
Second	9.0
Third	16.0
Fourth	4.5
Fifth	7.5
Sixth	6.5
Seventh	6.0
Eighth	4.5
Ninth	5.5
Tenth	6.5

(a) Describe the effect of repeated touching on the time taken for the gill to be exposed again.

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(3)

(b) Name the type of learning shown by a sea slug in this investigation.

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(1)

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(c) Explain how this learned response may be of benefit to the sea slug in its natural environment.

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(4) **Q7**

(Total 8 marks)

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8. The scientific document you have studied is adapted from articles on disease and epidemics in New Scientist, Biological Sciences Review and the website of AVERT, an international HIV and AIDS charity. Use the information from the document and your own knowledge to answer the following questions.

(a) Describe, using specific examples, evidence that the Black Death was caused by a virus.

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(b) Suggest reasons why it is likely that a vaccine for bird flu can be produced fairly easily, whereas no effective vaccine for malaria has yet been produced.

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(c) Explain how small samples of DNA from a burial site can be amplified and how such samples might be used to find the identity of an unknown virus.

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(d) Describe the risks of using genetically modified organisms.

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(e) A hybrid virus with a mixture of genes from the H5N1 flu virus and the human flu virus could be produced in cells infected with both. Explain how a hybrid virus could be

(i) particularly dangerous to humans

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(ii) useful in producing a vaccine.

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(f) Explain what is meant by a 'breathtaking selection pressure', and how this might have led to very high frequency of the mutant form of CCR5.

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(3)

(g) The South African government decided not to allow the use of ARV drugs for the treatment of HIV infected people. Suggest possible reasons for their decision.

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(h) Use information from the two studies of HIV infection in South Africa to describe the current pattern of infection. You should include reference to changes in infection rates between 2000 and 2005 and the effect of gender. Suggest reasons for the trends you observe, including reasons for the different findings of the two studies for infection of women with HIV in 2005.

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(7) **Q8**

(Total 30 marks)

TOTAL FOR PAPER: 90 MARKS

END