

Centre No.					
Candidate No.					

Paper Reference (complete below)					
				/	

Surname	Initial(s)
Signature	

Paper Reference(s)

6104/03

Edexcel GCE

Biology

Biology (Human)

Advanced

Unit Test 4C Core and Option
Human Health and Fitness

Tuesday 22 June 2004 – Morning

Time: 1 hour 30 minutes

Examiner's use only

--	--	--

Team Leader's use only

--	--	--

Materials required for examination

Ruler

Items included with question papers

Nil

Question Number	Leave Blank
1	
2	
3	
4	
5	
Paper 31 Total	
6	
7	
8	
9	
Paper 32 Total	
Total	

Instructions to Candidates

In the boxes above, write your centre number, candidate number, the paper reference, your signature, surname and initials. The paper reference is shown above.

Check that you have the correct question paper.

Answer ALL NINE questions in the spaces provided in this booklet.

Your answer to Question 5 should be written on the lined pages. If you need to use additional answer sheets, attach them loosely but securely inside 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 the 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.

Printer's Log. No.

N19074A



W850/R6104/57570 7/7/3/6700

This publication may only be reproduced in accordance with London Qualifications Limited copyright policy. ©2004 London Qualifications Limited.

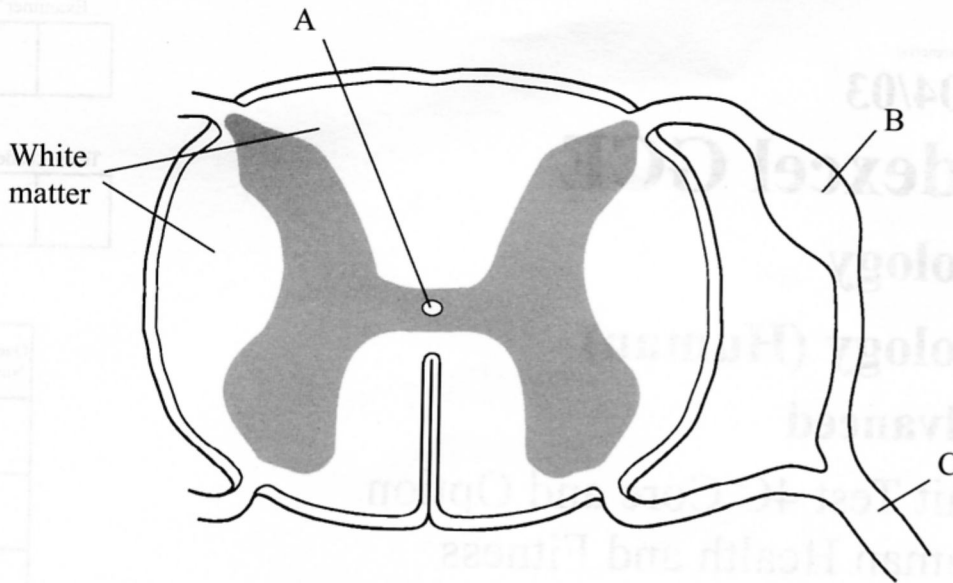
Turn over

Edexcel
Success through qualifications

Answer ALL questions in the spaces provided

Leave blank

1. The diagram below shows a transverse section of the spinal cord of a mammal.



(a) Name the parts labelled A, B, and C.

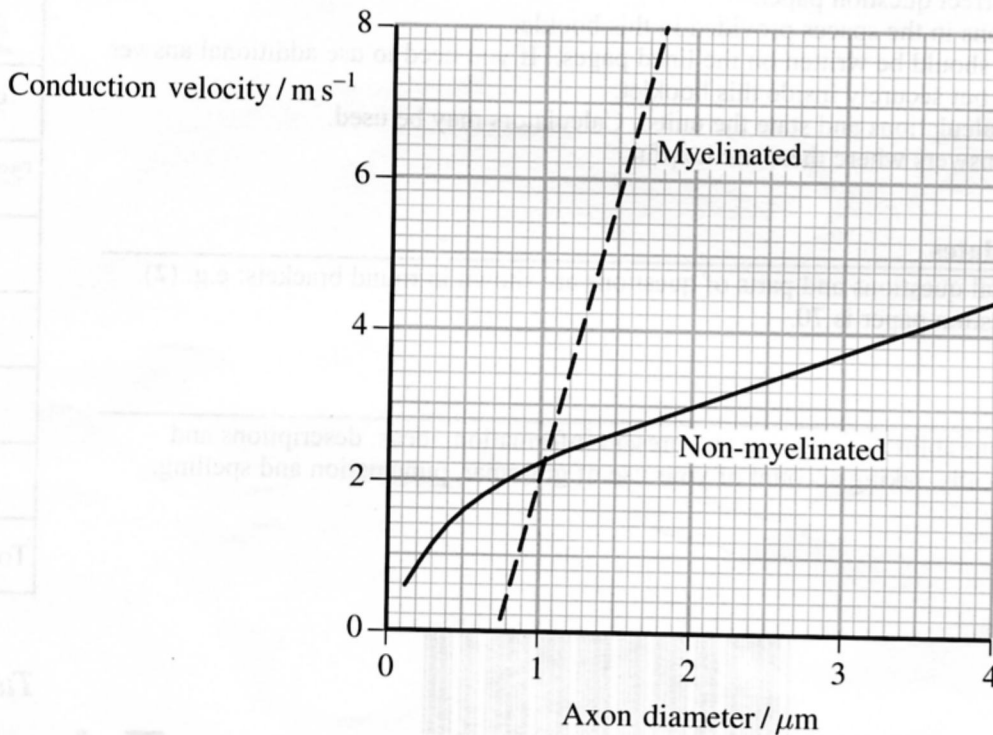
A

B

C

(2)

(b) The white matter in the spinal cord is mainly composed of the myelinated axons of neurones. The graph below shows the conduction velocity of myelinated and non-myelinated neurones.



(i) Compare the conduction velocities of myelinated and non-myelinated neurones.

Leave blank

.....
.....
.....
.....
.....
.....

(3)

(ii) Explain the role of myelin in nerve impulse transmission.

.....
.....
.....
.....

(2)

(c) Explain how simple reflexes are important in the responses of mammals to changes in the external environment.

.....
.....
.....
.....

(2)

Q1

(Total 9 marks)

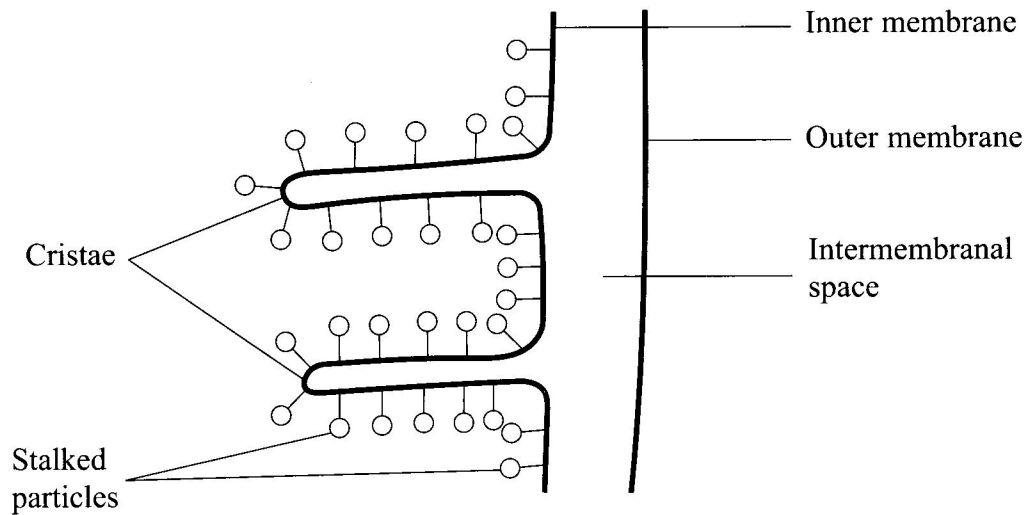
--

*Leave
blank*

BLANK PAGE

2. The diagram below shows a section through the membranes of a mitochondrion.

Leave blank



With reference to the structures labelled on the diagram, describe the role of the mitochondrial membranes in the production of ATP.

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

Q2

(Total 5 marks)

--

Leave blank

3. The table below shows the typical concentration of four solutes (urea, glucose, sodium ions and potassium ions) in the filtrate produced in the Bowman's capsule and in the proximal convoluted tubule of a nephron (kidney tubule).

Solute	Concentration of solute/g dm ⁻³	
	Bowman's capsule	Proximal convoluted tubule
Urea	0.30	0.55
Glucose	0.10	0.00
Sodium ions	0.33	0.33
Potassium ions	0.17	0.02

(a) Explain how the filtrate is produced in the Bowman's capsule.

.....

.....

.....

.....

.....

.....

(3)

(b) In the proximal convoluted tubule, large volumes of water are reabsorbed from the filtrate into the blood. Suggest why the concentration of sodium ions remains unchanged but the concentration of urea increases in the proximal convoluted tubule.

.....

.....

.....

.....

.....

.....

(3)

(c) The concentration of glucose decreases to zero in the proximal convoluted tubule. Suggest why it is necessary for complete glucose reabsorption to occur.

Leave blank

.....

.....

.....

.....

(2)

Q3

(Total 8 marks)

--

4. Six students carried out an investigation into the effect of temperature on respiration using tetrazolium chloride (TTC), an artificial hydrogen acceptor. TTC is colourless when oxidised and red/pink when reduced.

1 cm³ of TTC was added to a test tube containing 10 cm³ of yeast suspension and then placed in a waterbath at 20 °C. Each minute, the pink colour that developed was compared with a colour chart. The time for a standard pink colour to develop was recorded. This was repeated at four other temperatures.

The results are shown in the table below.

Student	Time taken for standard pink colour to develop/min				
	20 °C	30 °C	40 °C	50 °C	60 °C
1	61	43	18	10	8
2	58	41	16	10	8
3	65	43	16	8	8
4	58	45	21	10	9
5	62	45	19	9	8
6	62	42	17	9	8
Total	366	259	107	56	49
Mean	61	43	18	9	8

- (a) (i) Suggest why the times are recorded in minutes rather than seconds.

.....
.....
.....
.....

(2)

- (ii) Suggest **two** possible improvements to the procedure that might increase the reliability of the results.

.....
.....
.....
.....

(2)

(b) Explain how the colour change of the TTC indicates that the yeast is respiring.

Leave blank

.....

.....

.....

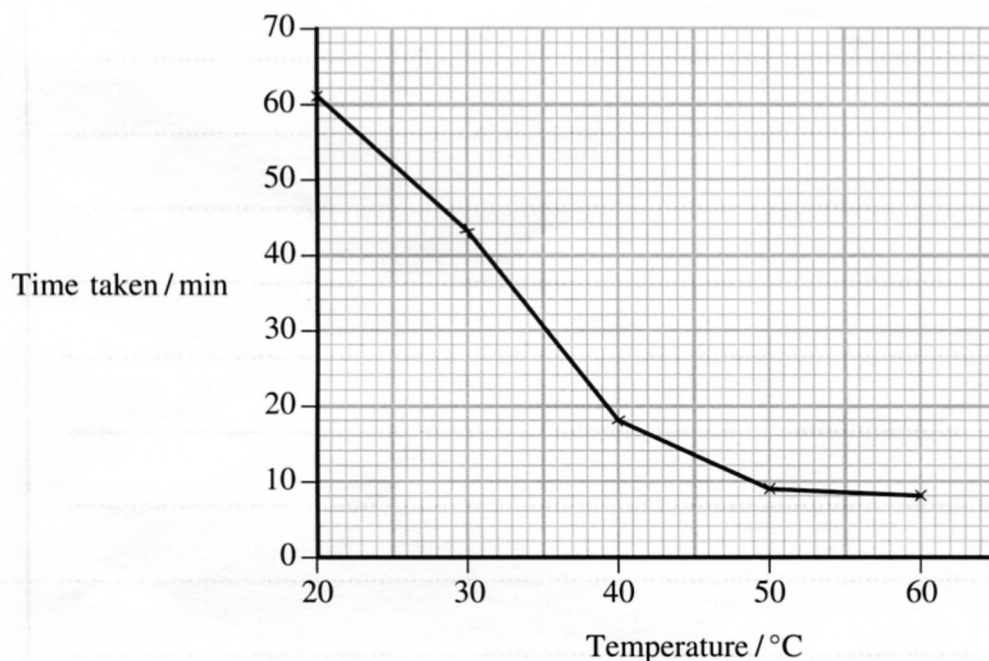
.....

.....

.....

(3)

(c) The mean times taken for the standard pink colour to develop at the different temperatures are shown in the graph below.



With reference to the graph, describe the effect of temperature on the rate of respiration of the yeast.

.....

.....

.....

.....

(2)

Q4

(Total 9 marks)

Option C: Human health and fitness

*Leave
blank*

6. Describe the structure of each of the following.

(a) A neuromuscular junction

.....
.....
.....
.....
.....
.....

(3)

(b) A lymph node

.....
.....
.....
.....
.....
.....

(3)

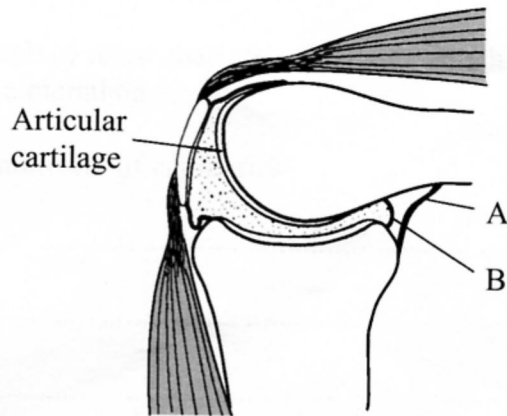
Q6

(Total 6 marks)

--

7. The diagram below shows the arrangement of tissues in a synovial joint.

Leave blank



(a) Name the parts labelled A and B.

A

B

(1)

(b) Describe how the structure of a synovial joint allows smooth movement.

.....
.....
.....
.....

(2)

(c) (i) In athletes, articular cartilage thickens as a result of training. Explain the benefit of thicker cartilage in a knee joint.

.....
.....
.....
.....

(2)

(ii) Name the condition that develops as a result of articular cartilage wearing away or becoming severely damaged.

.....

(1)

Q7

(Total 6 marks)

--

*Leave
blank*

BLANK PAGE

8. (a) Aerobic training programmes involve the regular and rhythmic use of muscles. This results in an increase in the number of capillaries and mitochondria in muscle.

Leave blank

Explain how each of these changes will enable an athlete to perform well in endurance events such as a marathon.

- (i) Increased numbers of capillaries

.....
.....
.....
.....
.....
.....

- (ii) Increased numbers of mitochondria

.....
.....
.....
.....

(5)

- (b) Name the type of muscle fibre that is better adapted for endurance events.

.....

(1)

- (c) Three to four hours before endurance events, athletes eat large quantities of complex carbohydrates such as pasta. Explain why this will delay the onset of fatigue.

.....
.....
.....
.....

(2)

Q8

(Total 8 marks)

--

Leave blank

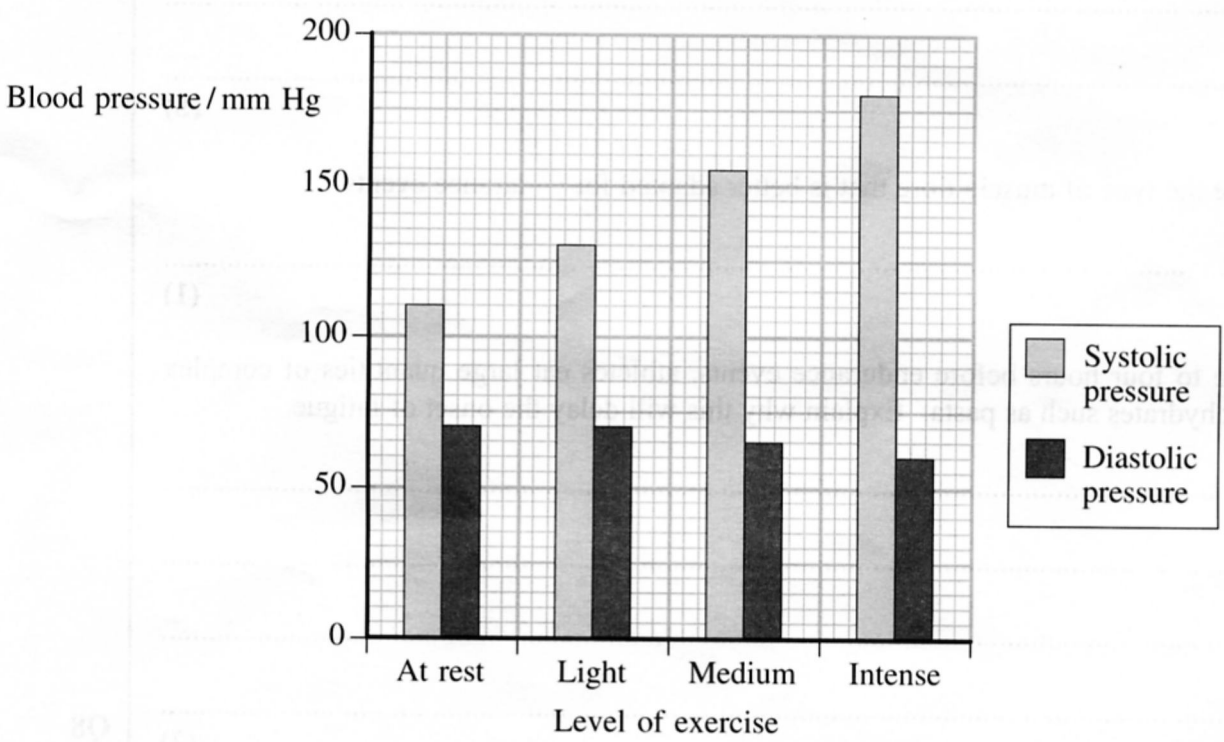
9. The data below show some of the changes that occur in the cardiovascular system as a result of different levels of exercise.

	Level of exercise			
	At rest	Light	Medium	Intense
Heart rate /beats min ⁻¹	72	144	160	190
Cardiac output /dm ³ min ⁻¹	5	13	16	21

(a) Using the data from the table, calculate the stroke volume when exercising at an intense level. Show your working.

Answer
(2)

(b) The graph below shows typical blood pressures at different levels of exercise.



Leave blank

(i) Explain what is meant by the term **blood pressure**.

.....
.....
(1)

(ii) With reference to the graph, describe the effect of exercise on blood pressure.

.....
.....
.....
.....
.....
.....
(3)

(iii) Using the data in the table and the graph, suggest why the systolic pressure rises with increasing level of exercise.

.....
.....
.....
.....
(2)

(c) State **two** sites in the body where blood pressure receptors are found.

1

2

(2)

Q9

--	--

(Total 10 marks)

TOTAL FOR PAPER: 70 MARKS

END