

Centre No.						Paper Reference					Surname	Initial(s)	
Candidate No.						6	1	0	4	/	0	2	Signature

Paper Reference(s)

6104/02

Edexcel GCE

Biology

Biology (Human)

Advanced

Unit 4B Core and Option

Food Science

Tuesday 21 June 2005 – Morning

Time: 1 hour 30 minutes

Examiner's use only

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Team Leader's use only

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Question Number	Leave Blank
1	
2	
3	
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Paper 21 Total	
6	
7	
8	
9	
Paper 22 Total	
Total	

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.

The paper reference is shown above. Check that you have the correct question paper.

Answer ALL 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 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 into account your use of grammar, punctuation and spelling.

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Answer ALL questions in the spaces provided.

1. (a) The table below compares three features of nervous and hormonal coordination. Complete the table to show the differences between the two types of coordination.

Feature	Nervous coordination	Hormonal coordination
Method of transmission		
Speed of transmission		
Duration of the response		

(3)

- (b) Give **one** similarity between the methods of transmission involved in nervous and hormonal coordination.

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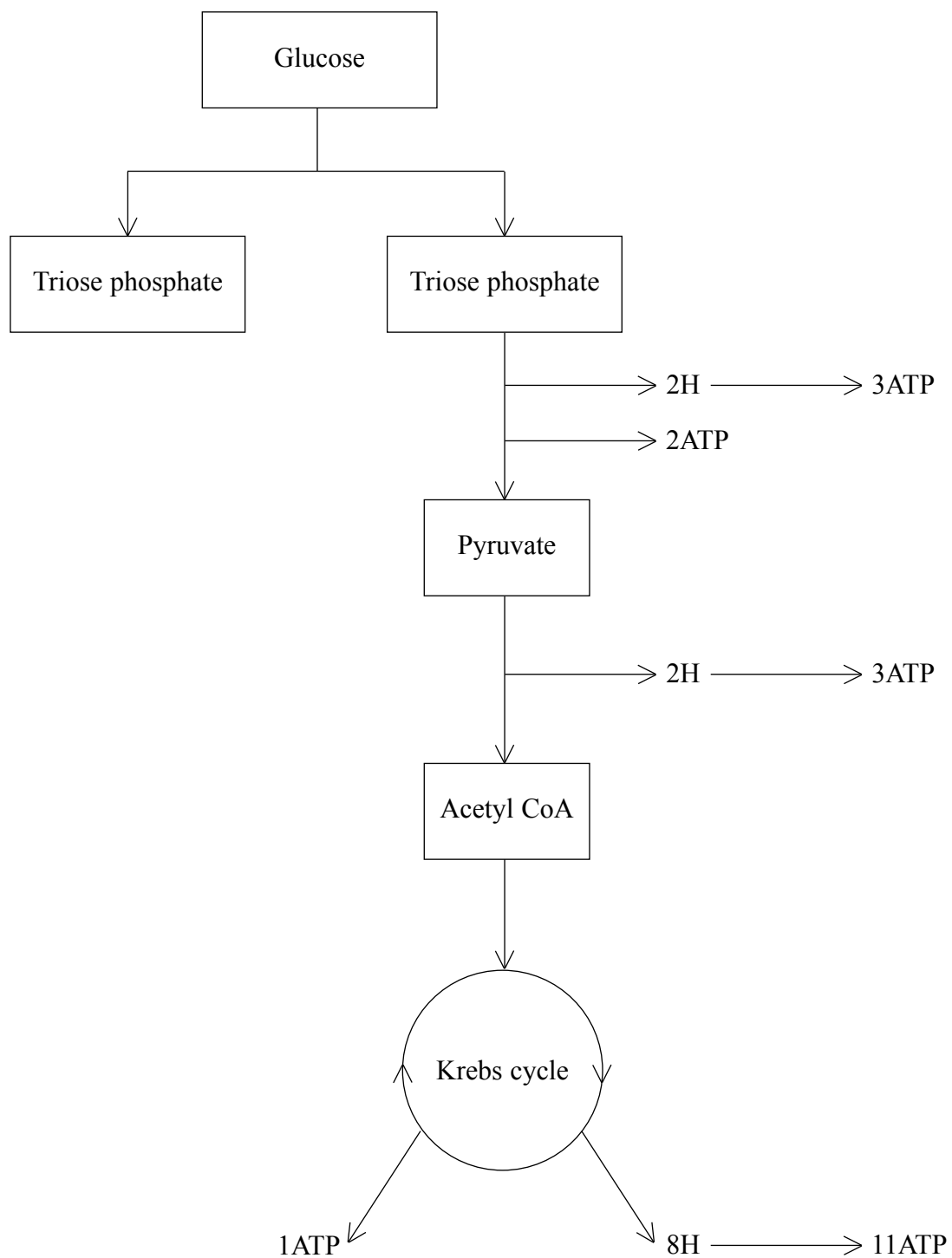
(1)

Q1

(Total 4 marks)



3. The flow diagram below shows some of the steps involved in glycolysis and the Krebs cycle. Some ATP is made directly. Hydrogen is also released and this can result in the production of more ATP.



(a) Describe how the hydrogen released during glycolysis and the Krebs cycle results in the production of ATP.

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(4)

(b) Using the information in the diagram, state the number of ATP molecules produced from **one** triose phosphate molecule.

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(1)

(c) As well as carbohydrates, triglycerides can be respired. The first step is to break down each triglyceride molecule into glycerol and three fatty acids.

Each fatty acid is broken down into acetyl CoA molecules. The acetyl CoA molecules then enter the Krebs cycle.

(i) Using the information in the diagram, state the number of ATP molecules produced from **one** acetyl CoA molecule.

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(1)

(ii) Suggest why fatty acids can only be respired under aerobic conditions.

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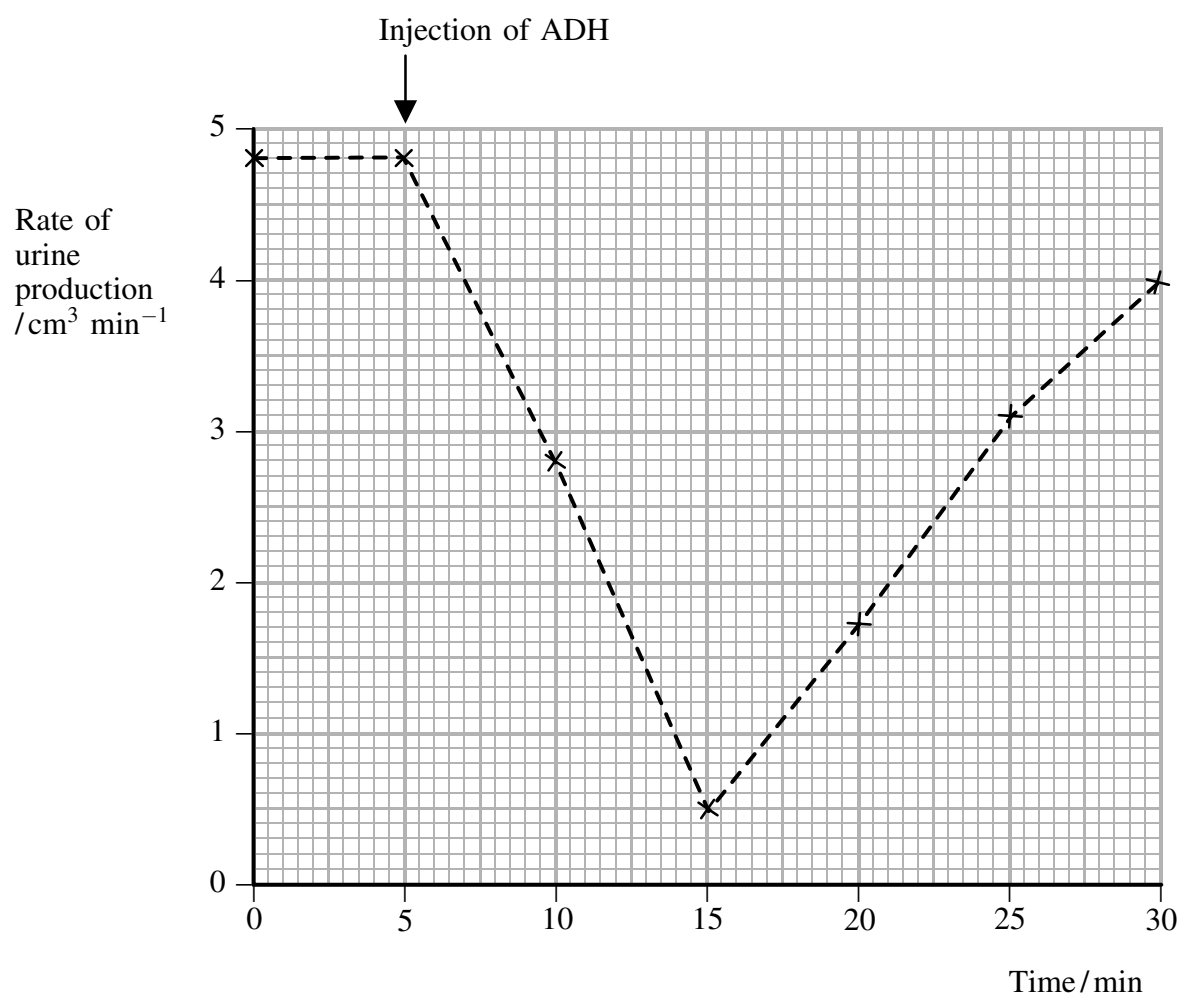
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(Total 9 marks)

Q3



4. An investigation was carried out into the effect of antidiuretic hormone (ADH) on urine production in a mammal. The rate of urine production was measured over a period of 30 minutes. Five minutes after measurements began, ADH was injected into a vein of the mammal. The results are shown in the graph below.



- (a) Name the gland that releases ADH.

..... (1)

- (b) Describe the effect of the injection of ADH on the rate of urine production in the mammal in this investigation.

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 (3)



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(c) Describe the mechanism by which ADH produces the effect seen in this investigation.

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(4)

(d) In a similar investigation, an injection of sodium chloride (salt) solution was given after five minutes instead of ADH. This injection was observed to affect urine production in a similar way to ADH. Suggest how the sodium chloride brought about this effect.

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(3)

(Total 11 marks)

Q4



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5. Give an account of the location and functions of each of the following areas of the mammalian brain: cerebral hemispheres, cerebellum and medulla.

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(Total 10 marks)

Q5

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Option B: Food Science.

6. The table below refers to constituents of the diet and the effects of their deficiencies. Complete the table by writing the appropriate word or words in the empty boxes.

Constituent of the diet	Description of one effect of deficiency
	Reduced ability to synthesise retinal pigments
Vitamin C (ascorbic acid)	
Calcium	
	Reduced ability of the blood to carry oxygen

Q6

(Total 4 marks)



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7. Food suppliers, such as supermarkets, find it economically important to prolong the shelf life (storage time) of their products. Many fruits and vegetables are pre-packed using film wrapping to prolong their shelf life.

(a) Explain how a film wrapper, that is more permeable to carbon dioxide than it is to oxygen, prolongs the shelf life of fruits such as tomatoes.

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(4)

(b) Pre-packed fatty foods often have antioxidants added to them. Suggest a reason for this.

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(1)



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(c) Sterilised milk can be stored for longer than untreated milk. Explain how sterilisation prolongs the shelf life of milk.

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(3)

(Total 8 marks)

Q7



8. The table below shows the changes in energy intake from food eaten between 1970 and 2000 in the United Kingdom. The figures show the mean intake per person per day.

Intake	Year			
	1970	1980	1990	2000
Total energy/kJ	10 750	9370	7860	6720
Total fat/g	119	106	86	65
Proportion of total energy derived from fat (%)	42	43	42	37

(a) (i) Calculate the percentage change in total energy intake from 1970 to 2000. Show your working.

Answer
(2)

(ii) Describe the change in the proportion of total energy derived from fat between 1970 and 2000.

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 (1)



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(iii) The total mass of fat eaten per person per day has decreased.

Suggest why, despite this decrease in fat consumption, the proportion of people who are obese has increased.

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(3)

(b) The energy (calorific) value of a food sample can be determined using a calorimeter. Describe how you would use a calorimeter in order to obtain the measurements needed to calculate the energy value of a sample of fat.

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(4)

(Total 10 marks)

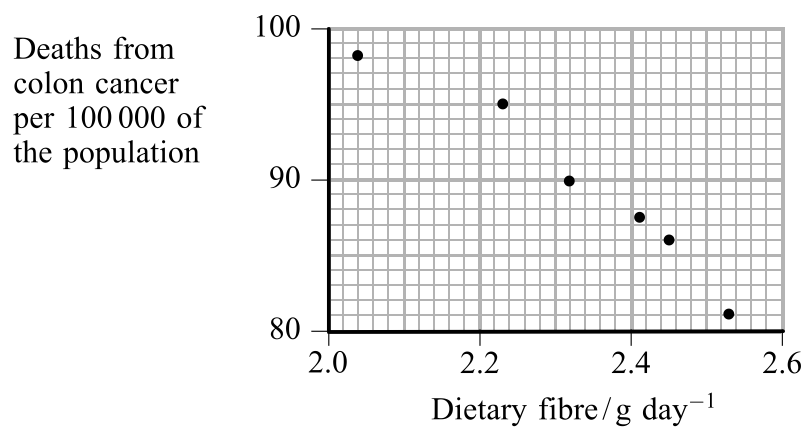
Q8

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9. It is suggested that the amount of dietary fibre has an influence on the occurrence of cancer of the colon and diverticular disease.

The graph below shows the number of deaths (mortality) from cancer of the colon plotted against the mass of dietary fibre.



- (a) (i) Describe the relationship between dietary fibre and mortality from cancer of the colon.

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(3)

- (ii) Explain why increasing the intake of dietary fibre may affect the incidence of cancer of the colon.

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(2)



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(b) Diverticular disease has been observed to be particularly associated with people over 70 years old. Suggest reasons for this observation.

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(3)

Q9

(Total 8 marks)

TOTAL FOR PAPER: 70 MARKS

END

