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 19 June 2007 – Morning

Time: 1 hour 30 minutes

Examiner's use only

Team Leader's use only

Question Number	Leave Blank
1	
2	
3	
4	
5	
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 NINE 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. The table below refers to three major stages of aerobic respiration and the products of each stage.

Complete the table by inserting the part of the cell in which the stage occurs and two products in the blank spaces.

Stage	Part of cell in which it occurs	Two products
Glycolysis		
Krebs cycle	Matrix of mitochondrion	
Electron transport chain		ATP and water

Q1

(Total 4 marks)

2. (a) The mammalian hormones, glucagon and follicle-stimulating hormone (FSH), both exert their effects on cells by binding to a receptor molecule on the cell surface membrane and stimulating an enzyme called adenyl cyclase.

Glucagon and FSH have different target organs. The cells of the target organs will only respond to the hormones if they have specific receptors on their surface membranes.

(i) Name **one** organ in the body of a mammal in which the cells have glucagon receptors.

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(ii) Name **one** organ in the body of a mammal in which the cells have FSH receptors.

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(2)

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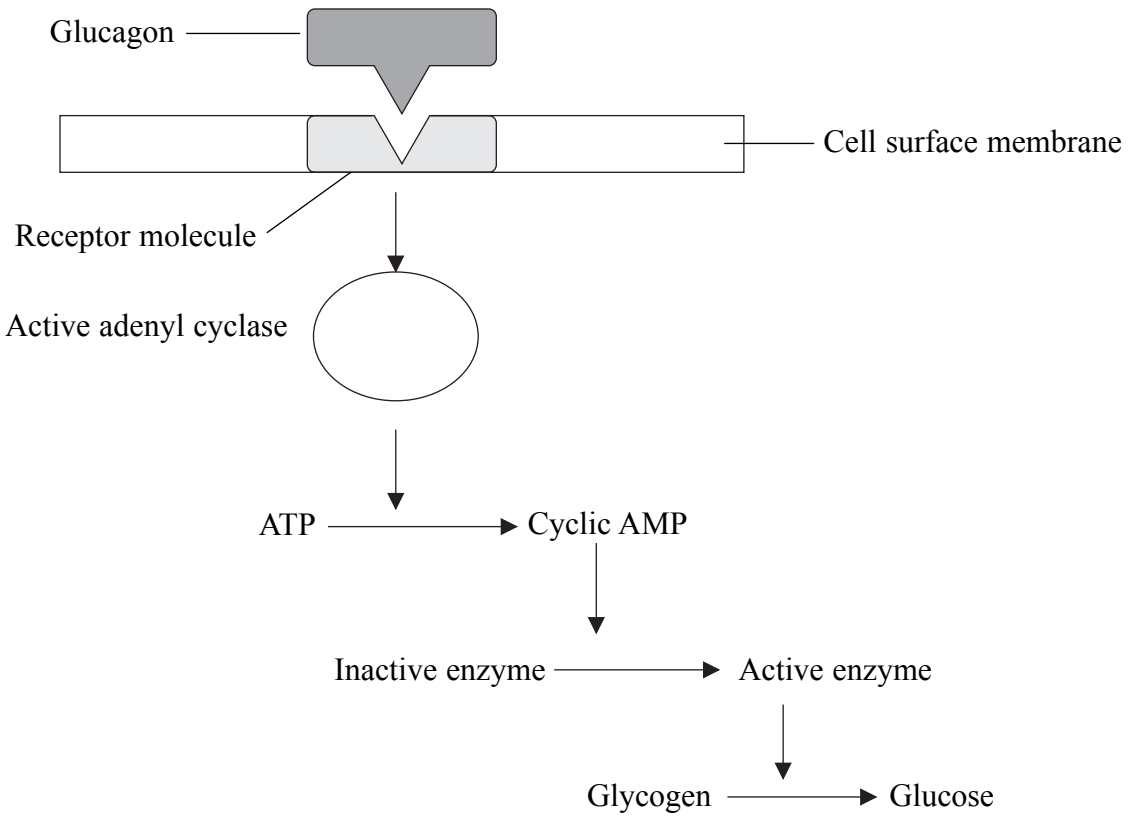
(b) The diagram below shows the action of glucagon when it combines with its target cell.



Use the diagram to explain how one molecule of glucagon can cause a relatively large increase in the concentration of glucose in the blood plasma.

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(3) **Q2**

(Total 5 marks)

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3. (a) Distinguish between the terms **anabolism** and **catabolism**. Give an example of each.

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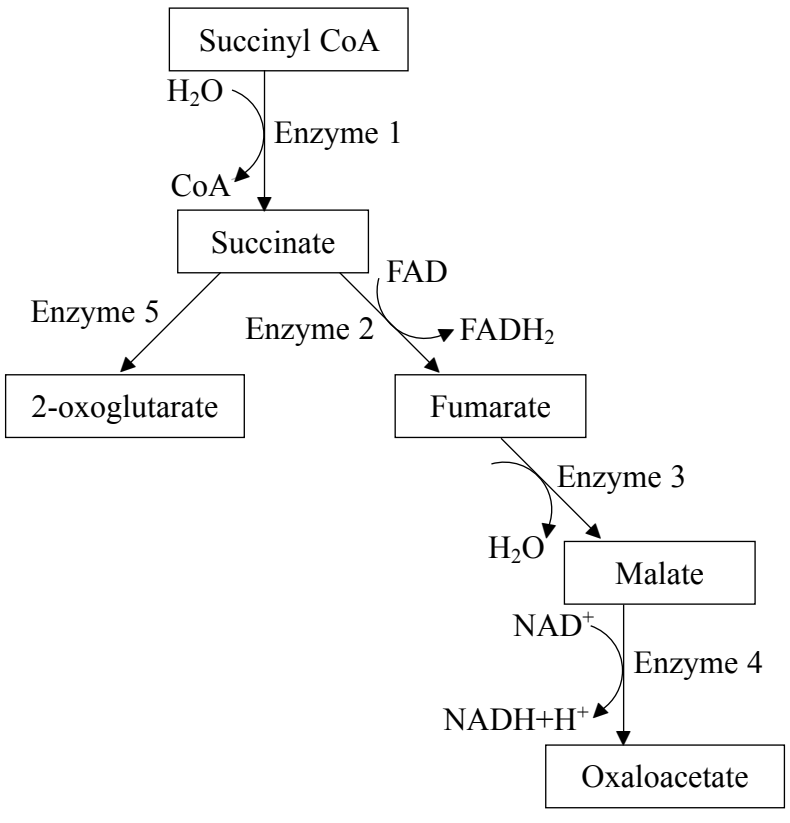
(3)

(b) The diagram below shows part of a metabolic pathway. Each reaction in the pathway is catalysed by a different enzyme. The enzymes have been numbered 1 to 5.



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(i) Enzyme 4 is a type of enzyme called an oxidoreductase. State the evidence shown in the pathway that supports this statement.

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(2)

(ii) Which enzyme in this metabolic pathway is a hydrolase?

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(1)

(iii) A high concentration of oxaloacetate inhibits enzyme 2. This enzyme catalyses the conversion of succinate into fumarate. Describe and explain the effects of a high concentration of oxaloacetate on this metabolic pathway.

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Q3

(Total 10 marks)

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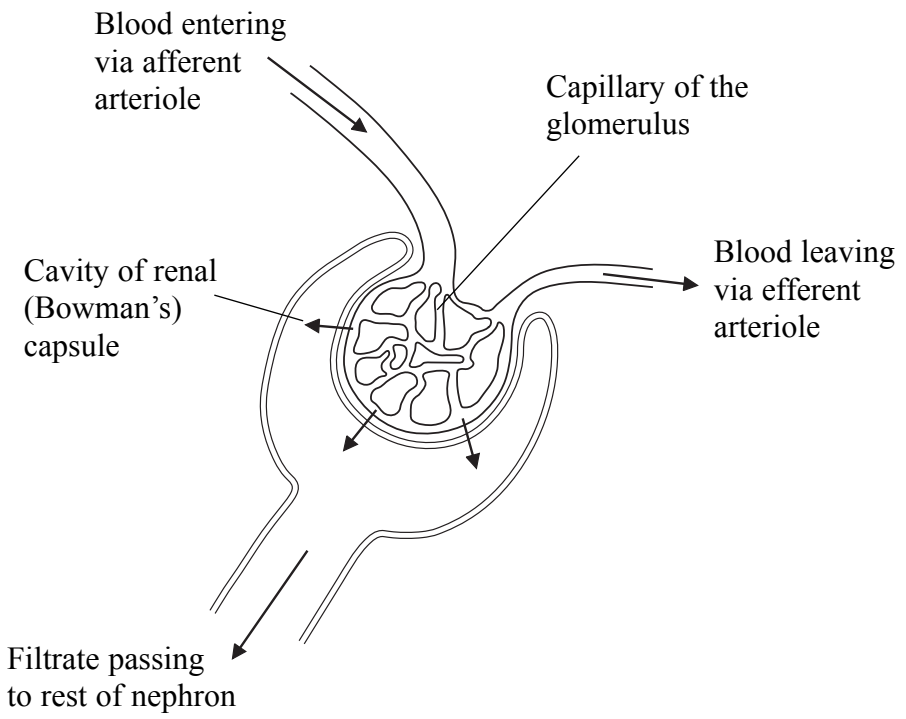
4. The diagram below shows part of a nephron from a mammalian kidney.



Atrial natriuretic factor (ANF) is a hormone that increases the diameter of the afferent arteriole and decreases the diameter of the efferent arteriole.

(a) Describe and explain the effects that this hormone will have on the rate of ultrafiltration.

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(b) Urea is present in urine. Describe how urea is produced.

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(3)

(c) A student measured the volume of urine that she produced on two different days. The concentration of urea in the urine on each day was determined. The results are shown in the table below.

Day	Volume of urine produced / dm^3	Concentration of urea / g dm^{-3}
1	1.2	15
2	1.8	8

(i) Calculate the percentage change in the concentration of urea between day 1 and day 2. Show your working.

Answer .....%

(3)

Leave blank

(ii) Suggest **two** possible reasons why the concentration of urea in the urine was lower on day 2. For each reason, explain why there would be a decrease in the concentration of urea in the urine.

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(3)

Q4

(Total 11 marks)

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5. Give an account of how a nerve impulse is generated in a post-synaptic neurone following the release of a neurotransmitter.

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Q5

(Total 10 marks)

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Option B: Food Science

6. (a) Describe how an unbalanced diet can lead to scurvy.

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(b) Describe how a lack of fibre in the diet can lead to diseases of the colon.

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(3) **Q6**

(Total 6 marks)

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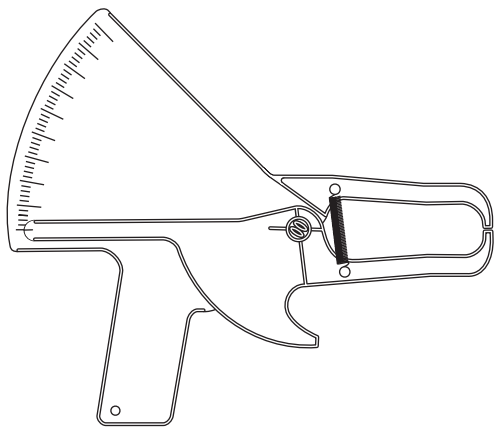
7. The diagram below shows the apparatus used to take skinfold measurements.



(a) Name this apparatus.

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(b) Explain how this apparatus is used to obtain skinfold measurements.

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(c) State **two** sites on the body where skinfold measurements are taken.

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(d) The measurements taken using this apparatus are used to estimate the percentage body fat of an individual. The table below shows readings taken from a seventeen year-old student. The readings were taken from slightly different positions on one part of the body.

Reading	Skinfold thickness / mm
1	13.0
2	13.5
3	12.0

The percentage body fat is estimated using the skinfold thickness readings and the data table below.

Mean skinfold thickness / mm	Percentage body fat (%)
10	15.2
11	16.4
12	17.4
13	18.4
14	19.3

(i) Estimate the percentage body fat of the student. Show your working.

Answer.....%

(2)

(ii) State **one** reason why this estimate may not be reliable.

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(1) **Q7**

(Total 8 marks)

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8. Postharvest changes in fruits are due to metabolic processes which continue after harvesting and result in the ripening of fruit.

The table below summarises the differences between unripe and ripe fruit.

Feature	**Unripe**	**Ripe**
Colour	Green	Red
Taste	Not Sweet	Sweet
Texture	Hard	Soft

(a) Explain how these changes are brought about.

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(b) Commercial fruit growers must take measures to delay ripening of fruit after harvesting.

(i) State **one** method used to delay ripening of fruit after harvest.

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(1)

(ii) Suggest **two** reasons why commercial fruit growers need to delay ripening.

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(2)

Q8

(Total 7 marks)

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9. Yeast is used in the production of wine.

(a) Describe the role of yeast in the production of wine.

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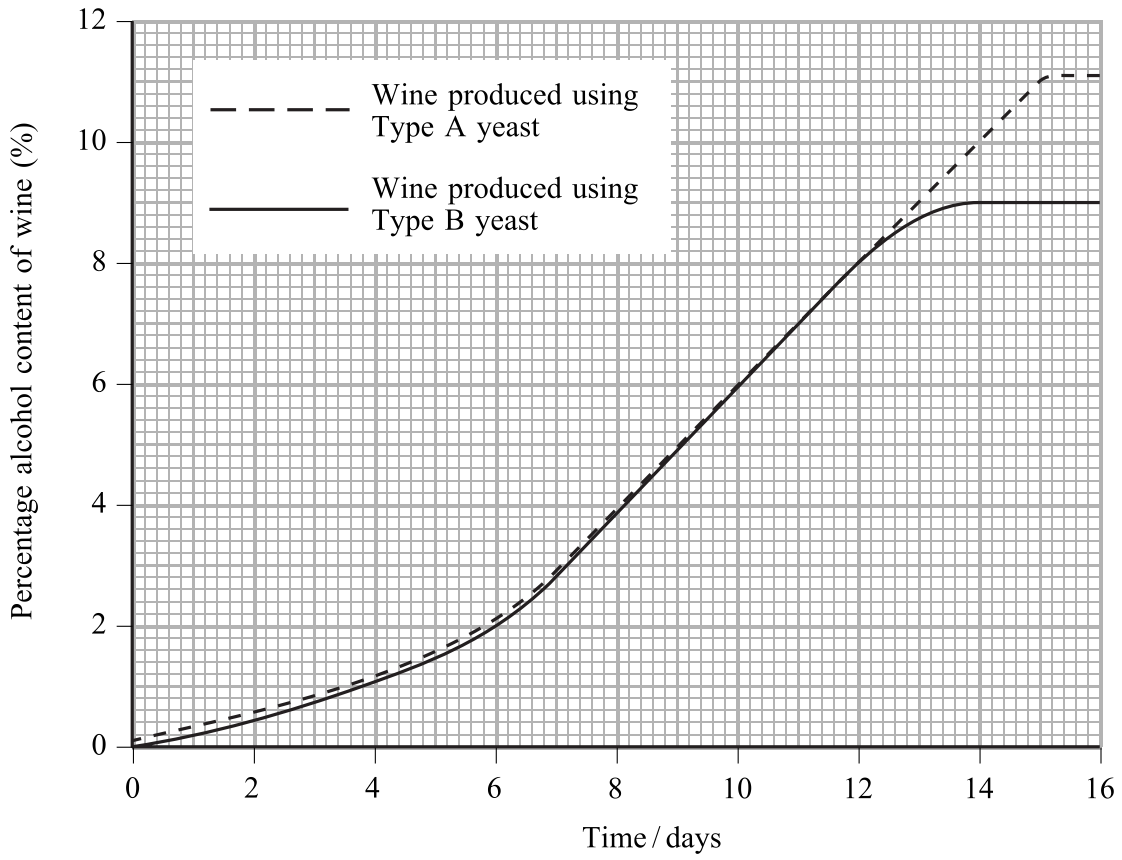
(b) The graph below shows the increase in alcohol during the production of two different wines using two different types of yeast (Type A and Type B).



(i) Compare the production of alcohol by the two different types of yeast.

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(ii) Explain the shape of the curve after day 14 for wine production by Type B yeast.

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(c) Suggest why these types of yeast could be used for bread dough production.

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(2) **Q9**

(Total 9 marks)

TOTAL FOR PAPER: 70 MARKS

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