

GCE
AS and A Level

Human Biology

AS exams 2009 onwards
A2 exams 2010 onwards

Unit 1: **Specimen question paper**

Version 1.0



Surname					Other Names				
Centre Number					Candidate Number				
Candidate Signature									

Leave blank



General Certificate of Education
Advanced Subsidiary Examination

HUMAN BIOLOGY

The body and its diseases

HBIO1

Specimen Paper

In addition to this paper you will require

- a ruler with millimetre measurements.

You may use a calculator.

Time allowed: 1 hour 30 minutes

Instructions

- Use a black ink or ball-point pen.
- Fill in the boxes at the top of this page.
- Answer **all** questions.
- Answer the questions in the spaces provided.
- Do all rough work in this book. Cross through any work you do not want to be marked.
- If you need additional space, you should continue your answers at the end of this book, indicating clearly which question you are answering.

Information

- The maximum mark for this paper is 80.
- The marks for questions are shown in brackets.
- You are reminded of the need for good English and clear presentation in your answers.
- Use accurate scientific terminology in all answers.

For Examiner's Use			
Number	Mark	Number	Mark
1		8	
2		9	
3		10	
4			
5			
6			
7			
Total (Column 1)			
Total (Column 2)			
Quality of Written Communication			
TOTAL			
Examiner's Initials			

Answer **all** questions in the space provided.

- 1 **Figure 1** and **Figure 2** show some of the information given about nutritional value on labels on two packets of processed food. Both packets contained chicken in a sauce.

Figure 1

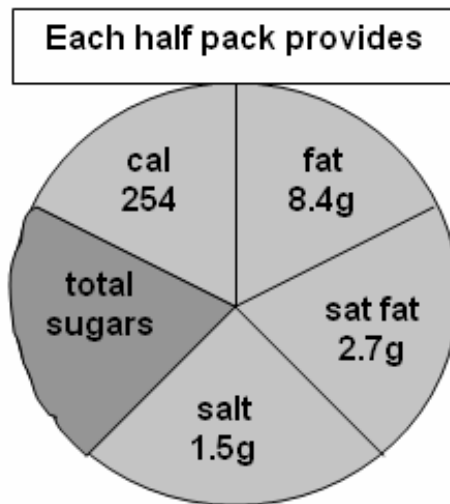
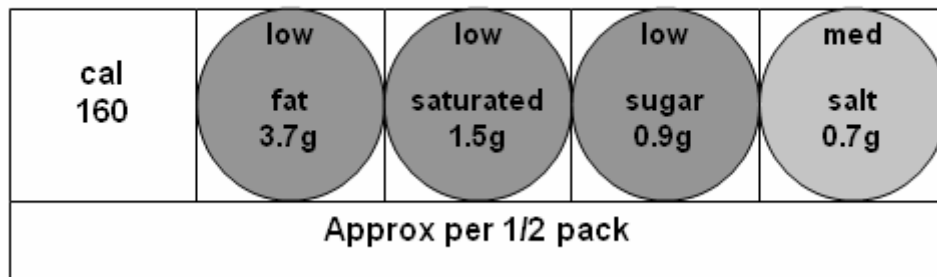


Figure 2



- (a) Give **one** reason why information is given about the content of

(i) fats

.....

(ii) salt.....

.....

(2 marks)

- (b) A customer was trying to decide which food was the healthiest for them to eat. Other than the information in **Figure 1** and **Figure 2**, give **two** other pieces of information the customer would need to know about these packets of food before making their decision. In each case give a reason for your answer.

1.....
.....
.....
.....
(2 marks)

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

Turn over for the next question

<hr/> 6

2 (a) A faulty CFTR protein leads to the symptoms of cystic fibrosis. Explain how.

.....

.....

.....

.....

.....

.....

(3 marks)

(b) Explain why a person with cystic fibrosis

(i) might eat a lot of food but not gain body mass,

.....

.....

.....

.....

(2 marks)

(ii) might have a persistent cough or wheeze?

.....

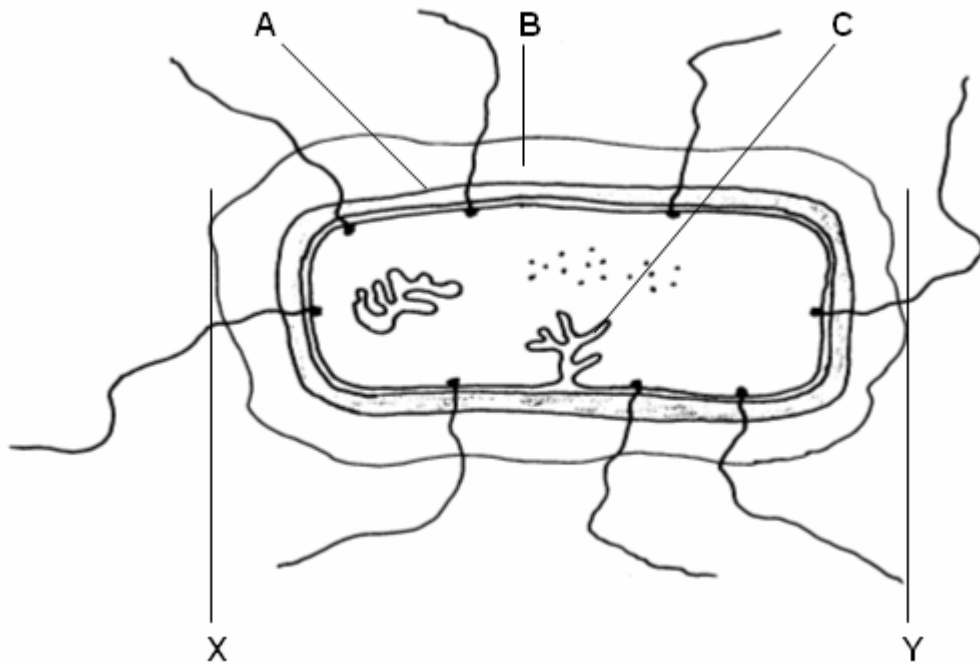
.....

.....

.....

(2 marks)

3 The diagram shows a bacterial cell.



(a) Name structures **A** and **B**.

A.....

B.....

(2 marks)

(b) What is the function of the ribosome?

.....

.....

(1 mark)

(c) The distance between X and Y is $2\mu\text{m}$. Calculate the magnification of this diagram.
Show your working.

Answer

(2 marks)

- (d) The diagram was drawn by a scientist who looked at many electron microscope images of sections of bacterial cells of the same species. The structure labelled **C** was seen in many sections.

Another scientist looked at cells of the same species of bacterium. He used a different method to prepare the cells for electronmicroscopy. This scientist did not see any structures like **C** in his cells. Suggest **one** reason why.

.....

.....

(1 mark)

6

Turn over for the next question

4 (a) (i) What is *oedema*?

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

(ii) There is a parasitic worm which can live and grow in lymph vessels in the leg. Suggest how this can lead to oedema.

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

(b) Explain how high blood pressure may lead to oedema.

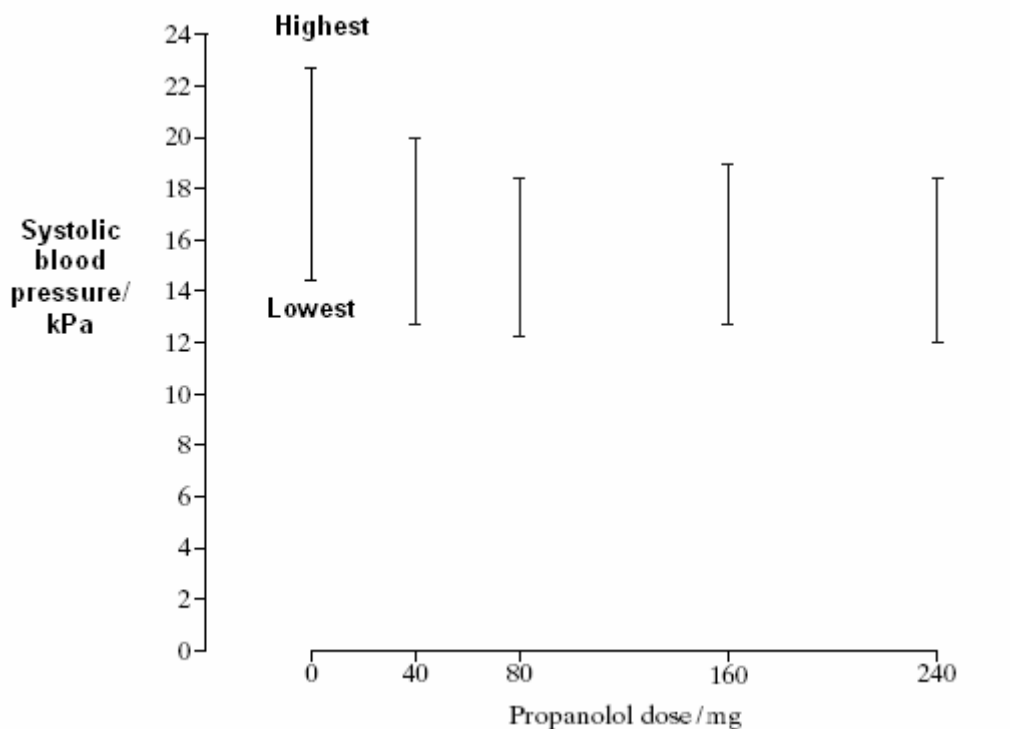
.....
.....
.....
.....
(2 marks)

- (c) A doctor studied a group of patients with high blood pressure. She measured the systolic blood pressure of each patient. This is the highest blood pressure measured in each patient.

The doctor then treated the group with different doses of propranolol.

For each dosage, she measured the systolic pressure of each patient.

The graph shows the highest and lowest systolic pressures measured in the group of patients at each dose of propranolol.



Which of these doses of propranolol would you recommend for these patients? Explain your answer.

Dose.....mg

Explanation

.....

.....

.....

(2 marks)

- 5 A scientist investigated the effect of smoking on the risk of suffering a myocardial infarction. Two matched groups of women aged 16-44 years were studied. Both groups had a mean age of 40.5 years. One group of women had suffered a myocardial infarction. The other group of women had not had a myocardial infarction.

The women were asked to complete a questionnaire which included a question asking them how many cigarettes they smoked per day.

	Number of cigarettes smoked per day					
	0	1-5	6-10	11-19	20-39	40 plus
Percentage of women who had suffered a myocardial infarction	19.6	2.2	7.2	14.5	46.7	9.8
Percentage of women who had not suffered a myocardial infarction	70.0	2.4	6.5	6.8	13.8	0.5

- (a) Explain why these results are given as percentages.

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

- (b) Describe the results.

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

- (c) (i) Both groups of women had the same mean age. Give **two** other pieces of information that you would need to know about the women, to ensure that the data from the two groups could be safely compared?

1

.....

.....

.....

(2 marks)

2

.....

.....

.....

(2 marks)

- (ii) Evaluate the reliability of the data about the number of cigarettes smoked per day.

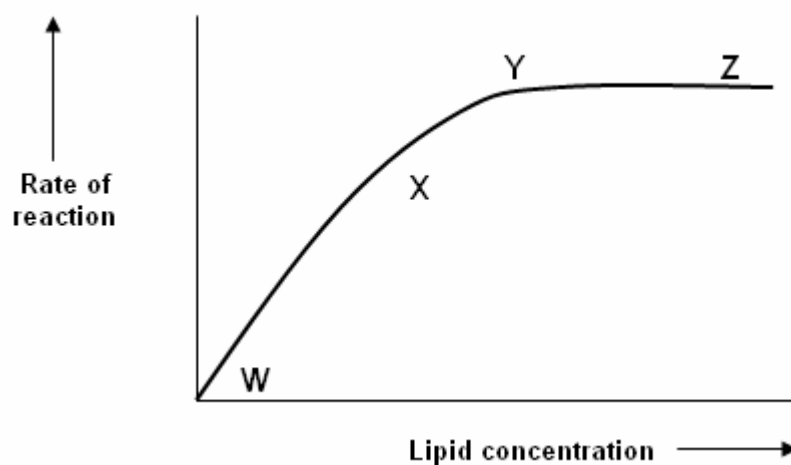
.....

.....

(1 mark)

Turn over for the next question

- 6 (a) Students investigated the effect of lipid concentration on the rate of lipase activity. The results are shown in the graph.



- (i) The rate of reaction increases between **W** and **X**. Explain why.

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

- (ii) The rate of reaction does not increase between **Y** and **Z**. Explain why.

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

- (b) When lipid is hydrolysed by lipase fatty acids are produced that lower the pH. One group of students used a pH probe to measure the fall in pH during this investigation. Another group of students used pH paper to measure the fall in pH. The two groups of students obtained results that were slightly different. Explain why.

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

- (c) Olestra is a lipid substitute used in some low-calorie foods. Olestra consists of a sugar molecule with fatty acids attached to it. It is not broken down in the human intestines. Suggest why.

.....

.....

.....

.....

(2 marks)

6

Turn over for the next question

- 7 (a) Proteins and polysaccharides are important components of the human diet. They are digested in the gut.

- (i) Name the type of reaction involved in the digestion of large biological molecules into smaller molecules.

.....
(1 mark)

- (ii) Name the monomers which make up

proteins

starch.....

(2 marks)

- (b) A doctor carried out an investigation into the causes of pancreatitis in a group of patients with the condition. The table shows the results.

Cause of pancreatitis	Details of patients		
	Number of patients	Male	Female
Obstruction of bile duct	24	8	18
Alcohol abuse	18	14	4
Drug induced	4	4	0
Unknown cause	10	3	7

The doctor concluded that men were more likely to get pancreatitis as the result of alcohol abuse and drug use than women. He also concluded that women were more likely to develop pancreatitis from obstruction of the bile duct. Do the results support these statements? Explain your answer.

.....

.....

.....

.....

.....

.....

.....

.....

(4 marks)

Turn over for the next question

<hr/> 7

8 (a) Describe atheroma formation.

.....

.....

.....

.....

.....

.....

.....

.....

(4 marks)

(b) Describe and explain how angioplasty relieves the symptoms of angina.

.....

.....

.....

.....

.....

.....

.....

.....

.....

(4 marks)

<hr/> 8

- 9 Variant CJD is the human form of BSE (mad cow disease). A protein causes variant CJD. A person can have this protein in their body for many years before developing any symptoms. It is not known if all people carrying the protein will develop the disease. A test is being developed to determine if a sample of a person's urine contains this protein. The test uses an antibody.

- (a) This test is specific for the protein causing variant CJD. Explain why.

.....

.....

.....

.....

(2 marks)

- (b) Some doctors have suggested using this test to find out how many people have the protein that may lead to variant CJD. There is no cure for variant CJD, which is a fatal condition.

Suggest advantages and disadvantages of carrying out such a test programme.

.....

.....

.....

.....

.....

.....

(3 marks)

10 Scientists have found that wallaby milk contains a molecule that is a very effective antibiotic. When born, baby wallabies crawl into their mother's pouch, where they latch on to milk-bearing teats. A newborn wallaby is a tiny, bean-shaped creature that is not fully developed. It lacks a developed immune system, relying on substances in its mother's milk to protect it against pathogens. Now a unique antimicrobial substance has been discovered in wallaby milk that could be used in hospitals to fight deadly antibiotic-resistant bacteria.

- (a) (i) Describe an investigation you could carry out to show that wallaby milk contains a substance that can kill bacteria.

.....

.....

.....

.....

.....

.....

.....

(4 marks)

- (ii) Scientists are very hopeful that this antibiotic may be useful in fighting antibiotic-resistant bacteria in hospitals. Suggest why.

.....

.....

.....

.....

(2 marks)

- (iii) Although the new antibiotic is very effective at killing pathogens, it still may not be useful to treat infections in hospitals. Suggest reasons why.

.....

.....

.....

.....

.....

.....

(3 marks)

- (iv) It is thought that the new antibiotic makes the membrane of the bacterial cell more permeable. Explain why this would kill the cell.

.....

.....

.....

.....

(2 marks)

- (b) (i) Apart from the antibiotic molecule, explain how the mother's milk protects the newborn wallaby from pathogens.

.....

.....

.....

.....

.....

.....

(3 marks)

- (ii) A wallaby has an immune system very similar to that in humans. Describe how the mother's immune system produces antibodies against pathogens.

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

(6 marks)

<hr/> 20

END OF QUESTIONS