



UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS  
General Certificate of Education Ordinary Level

CANDIDATE  
NAME

CENTRE  
NUMBER

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CANDIDATE  
NUMBER

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**HUMAN AND SOCIAL BIOLOGY**

**5096/21**

Paper 2

**October/November 2012**

**2 hours**

Candidates answer on the Question Paper.

No Additional Materials are required.

**READ THESE INSTRUCTIONS FIRST**

Write your Centre number, candidate number and name on all the work you hand in.

Write in dark blue or black pen.

Do not use staples, paper clips, highlighters, glue or correction fluid.

**DO NOT WRITE IN ANY BARCODES.**

Write your answers in the spaces provided on the question paper.

**Section A**

Answer **all** questions.

You are advised to spend no longer than 1 hour on Section A.

**Section B**

Answer **both** the questions.

**Section C**

Answer **either** question **9** or question **10**.

At the end of the examination fasten all your work securely together.

The number of marks is given in brackets [ ] at the end of each question or part question.

For Examiner's Use	
1	
2	
3	
4	
5	
6	
<b>Section A sub-total</b>	
7	
8	
<b>Section C</b>	
9	10
<b>Total</b>	

This document consists of **22** printed pages and **2** blank pages.



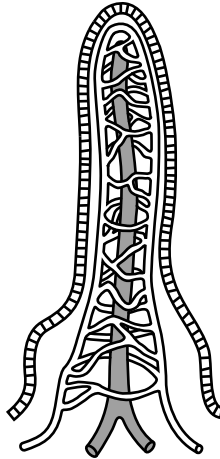


**Section A**

Answer **all** the questions.

Write your answers in the spaces provided.

- 1 (a) Some parts of the alimentary canal contain villi. Fig. 1.1 shows a single villus.



**Fig. 1.1**

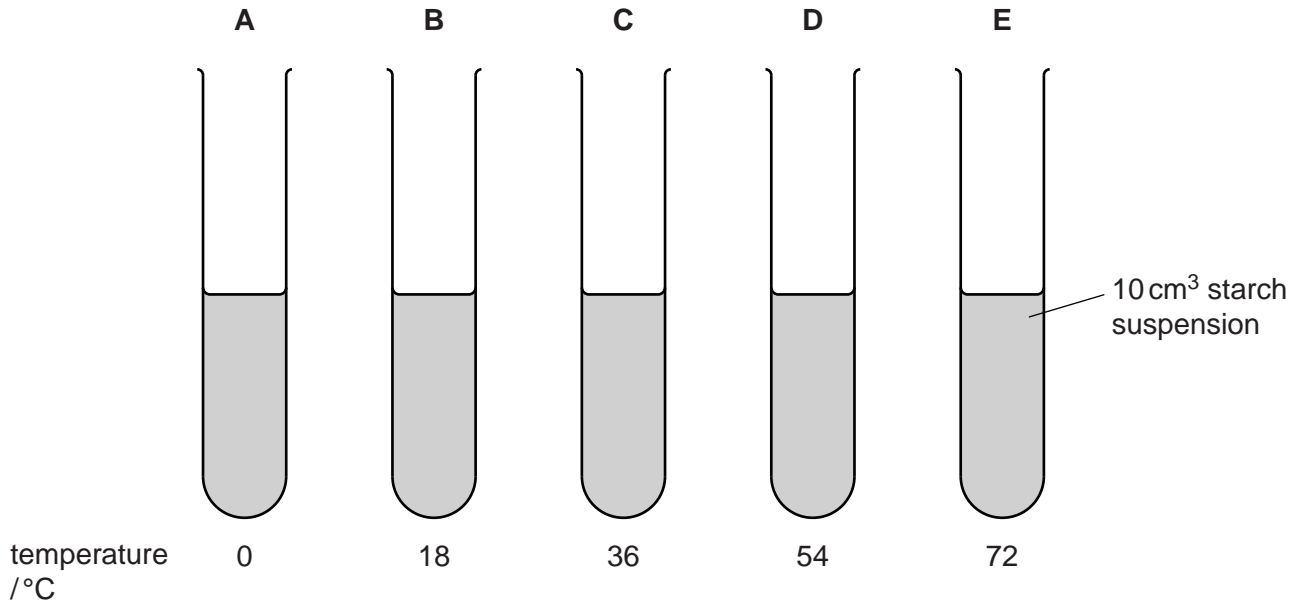
- (i) Name a part of the alimentary canal where villi are present.

.....[1]

- (ii) Explain how villi absorb the products of starch digestion.

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.....  
.....[4]

An investigation to find the effects of temperature on the activity of amylase was carried out. 10 cm<sup>3</sup> of starch suspension was added to each of five test-tubes and these were placed in different temperatures as shown in Fig. 1.2.



**Fig. 1.2**

The test-tubes were left for five minutes. 2 cm<sup>3</sup> of amylase solution was then added to each of the test-tubes at the same time to begin the reaction.

At one minute intervals a drop of liquid was taken from each test-tube and added to a drop of iodine solution on a white tile. The results are shown in Table 1.1.

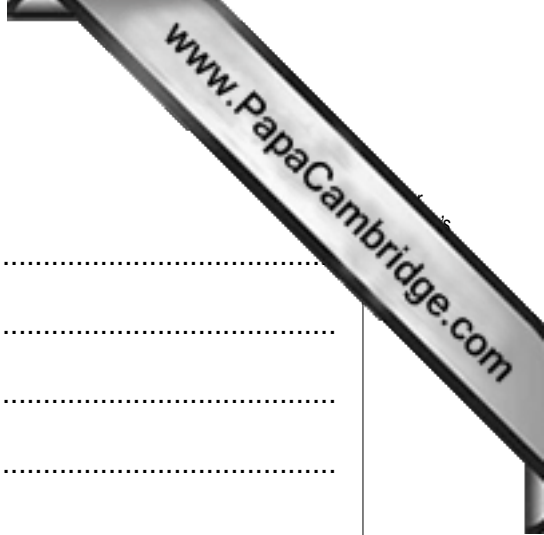
**Table 1.1**

time/min	test-tube				
	A	B	C	D	E
1	●	●	●	●	●
2	●	●	●	●	●
3	●	●	○	●	●
4	●	●	○	○	●
5	●	○	○	○	●

key ● blue-black  
○ orange-red

**(b)** Explain why the tubes were left for five minutes **before** amylase was added.

.....  
.....[1]



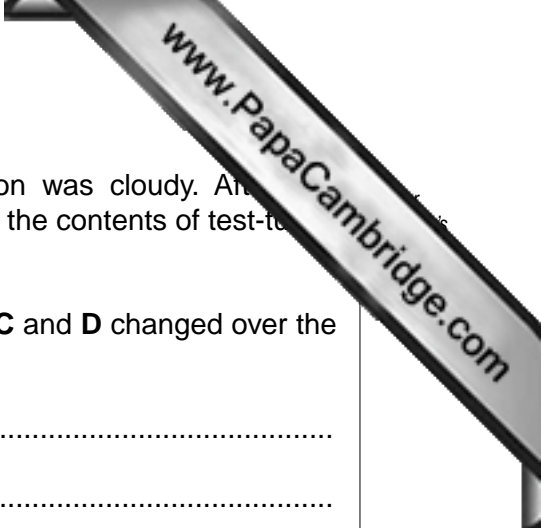
(c) Explain the results in test-tubes **A** and **E**.

.....  
.....  
.....  
.....  
.....  
.....  
.....[3]

(d) The results in Table 1.1 show that the orange-red colour did not appear in the samples taken from test-tubes **B**, **C** and **D** at the same time.

Explain the results in test-tubes **B**, **C** and **D**.

.....  
.....  
.....  
.....  
.....  
.....  
.....  
.....  
.....[4]



- (e) At the beginning of the investigation the starch suspension was cloudy. After five minutes, the contents of test-tubes **B**, **C** and **D** were clear but the contents of test-tubes **A** and **E** were still cloudy.

Explain why the appearance of the contents of test-tubes **B**, **C** and **D** changed over the five minutes.

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

[3]

- (f) After five minutes, test-tubes **A** and **E** were placed in the 36°C waterbath and left for some more time.

Suggest **and** explain what would happen in test-tubes **A** and **E**.

- (i) test-tube **A**

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

[2]

- (ii) test-tube **E**

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

[2]

[Total: 20]

**Please turn over for Question 2.**

2 Cigarette smoke contains carbon monoxide. As part of a study, a large number of men in the UK were asked how many cigarettes they smoked each day. The quantity of carboxyhaemoglobin in the blood of each man was also measured.

The results are shown in Table 2.1.

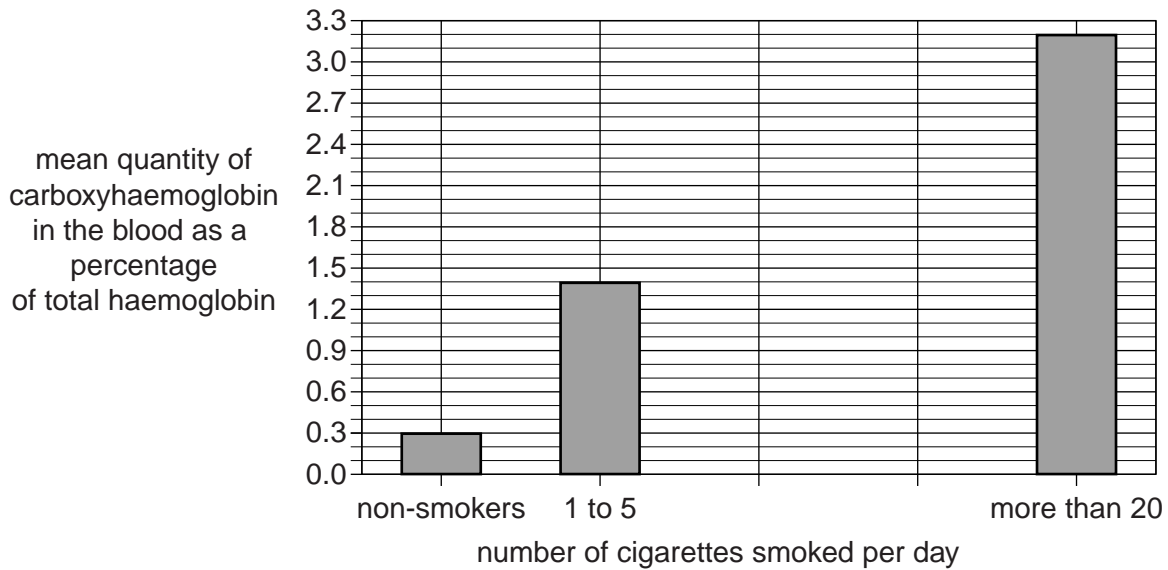
**Table 2.1**

number of cigarettes smoked per day	mean quantity of carboxyhaemoglobin in the blood as a percentage of total haemoglobin
0 (non-smokers)	0.3
1 to 5	1.4
6 to 10	2.2
11 to 20	3.1
more than 20	3.2

(a) The results for three of these groups are plotted on the bar chart in Fig. 2.1.

Use the results in Table 2.1 to complete the bar chart.

[2]



**Fig. 2.1**

(b) What can you conclude from these results about the relationship between cigarette smoking and the quantity of carboxyhaemoglobin in the blood?

.....

.....

.....

.....

[2]



The World Health Organisation (WHO) recommends that carbon monoxide levels in the air be less than 10 parts per million (ppm).

A similar study on the effects of smoking was carried out in an African city which had atmospheric carbon monoxide levels around 35 ppm.

The results are shown in Table 2.2.

**Table 2.2**

	mean quantity of carboxyhaemoglobin in the blood as a percentage of total haemoglobin
non-smokers	2.0
smokers	4.1

(c) Suggest reasons why the results for the African city shown in Table 2.2 are different from the results for the UK shown in Table 2.1.

.....

.....

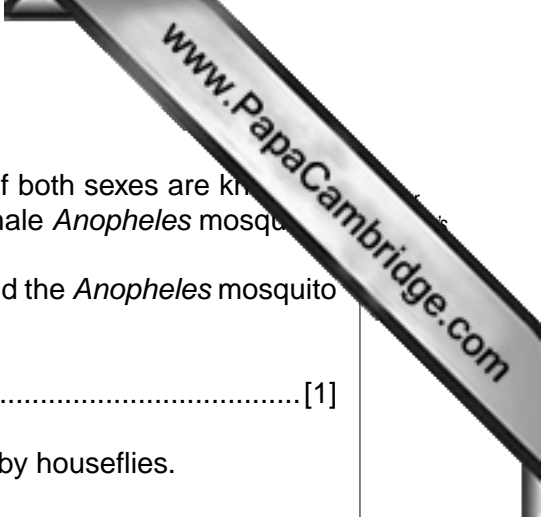
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.....

.....

..... [3]

[Total: 7]



3 Certain diseases are known to be spread by insects. Houseflies of both sexes are known to spread a variety of diseases, but malaria is only spread by the female *Anopheles* mosquito.

(a) State the term that is applied to organisms like the housefly and the *Anopheles* mosquito that spread disease.

.....[1]

(b) (i) State a type of disease-causing organism that is spread by houseflies.

.....[1]

(ii) Give an example of a disease that is spread by houseflies.

.....[1]

(c) State **two** precautions that should be taken in kitchens to prevent houseflies spreading disease.

1. ....  
.....

2. ....  
.....[2]

(d) Only the female *Anopheles* mosquito spreads malaria. Explain why.

.....  
.....  
.....  
.....[2]

[Total: 7]

- 4 Mothers encourage their babies to start eating solid foods at about six months of age. About this time the babies' teeth start to emerge and some babies are given teething biscuits.

The quantities of some nutrients in human breast milk and teething biscuits are shown in Table 4.1.

**Table 4.1**

nutrient	unit	value for each nutrient per 100 grams	
		human breast milk	teething biscuits
water	g	87.5	6.4
protein	g	1.0	10.7
fat	g	4.4	4.2
carbohydrates	g	6.9	76.4
fibre	g	0.0	1.4
calcium	mg	32	263
iron	mg	0.03	3.55
sodium	mg	17	362
vitamin C	mg	5	9
vitamin A	$\mu\text{g}$	61	28
vitamin D	$\mu\text{g}$	1	7

Use the information in Table 4.1 to answer the following questions.

- (a) State **two** nutrients that are **not** present in significant amounts in breast milk.

1. ....

2. .... [2]

- (b) State **two** nutrients that are present in both breast milk and teething biscuits that are important in the formation of bones and teeth.

1. ....

2. .... [2]

- (c) The quantity of iron in teething biscuits is significantly greater than that in breast milk. Suggest why this is good for the baby.

.....

.....

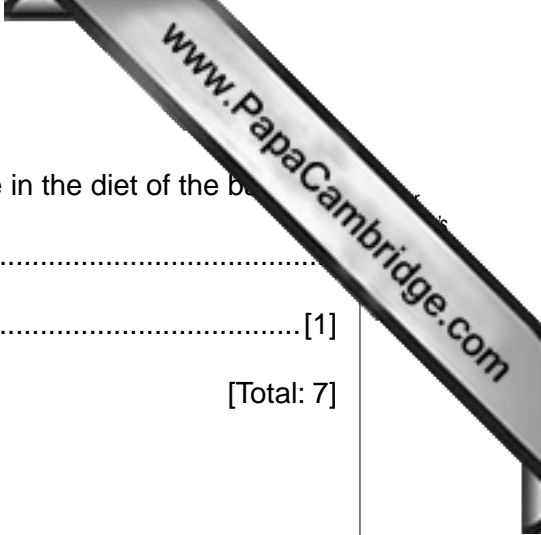
.....

..... [2]

(d) Teething biscuits contain fibre. Explain the importance of fibre in the diet of the baby.

.....  
..... [1]

[Total: 7]



5 Fig. 5.1 shows the processing of amino acids by the liver.

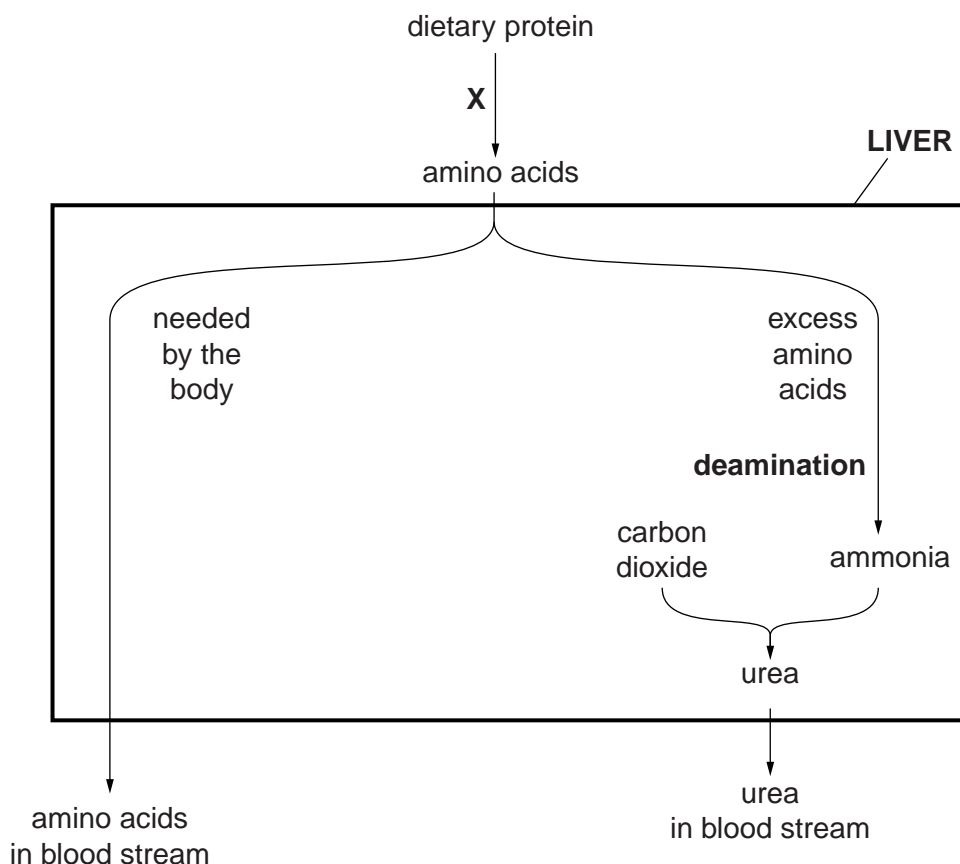


Fig. 5.1

Use the information in Fig. 5.1 to answer the questions below.

(a) Name the process that occurs at X.

.....[1]

(b) State the process that produces carbon dioxide.

.....[1]

(c) Some amino acids pass through the liver and are carried round the body in the blood stream. State what happens to these amino acids.

.....[1]

(d) Describe what happens to the ammonia in the liver and suggest why.

.....  
 .....  
 .....  
 .....  
 .....[2]

6 Blood normally clots when the body is wounded in some way.

(a) Explain the advantages of blood clotting after wounding.

.....  
.....  
.....  
..... [2]

Blood may clot to form a thrombosis in other circumstances. Deep vein thrombosis (DVT) occurs if a blood clot forms in a vein in a leg, especially where the vein passes between layers of muscle.

The likelihood of DVT is increased by a number of factors such as:

- ageing
- lack of exercise
- obesity

(b) Suggest why veins in the leg are more likely to be affected by DVT than veins in the upper body.

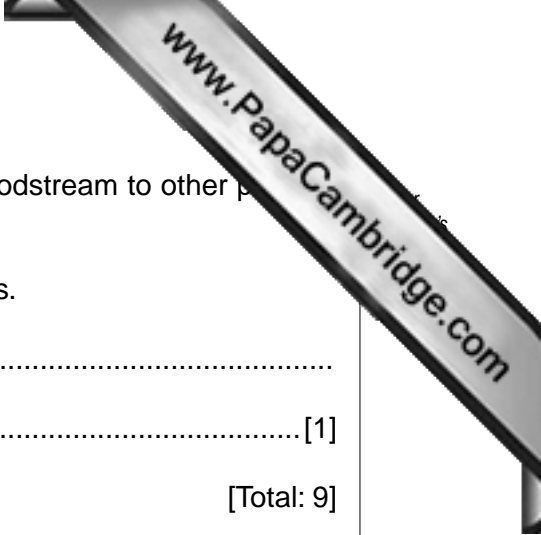
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.....  
..... [2]

(c) Suggest why lack of exercise during a long air flight may increase the chance of DVT occurring.

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.....  
..... [2]

(d) Suggest why obesity may increase the risk of DVT.

.....  
.....  
.....  
..... [2]



- (e) If part of a blood clot breaks off, it may travel through the bloodstream to other parts of the body.

Suggest a possible condition that may occur as a result of this.

.....

..... [1]

[Total: 9]

## Section B

Answer **both** questions in this section.

Write your answers in the spaces provided.

- 7 Fig. 7.1 shows a kidney nephron and associated blood vessels.

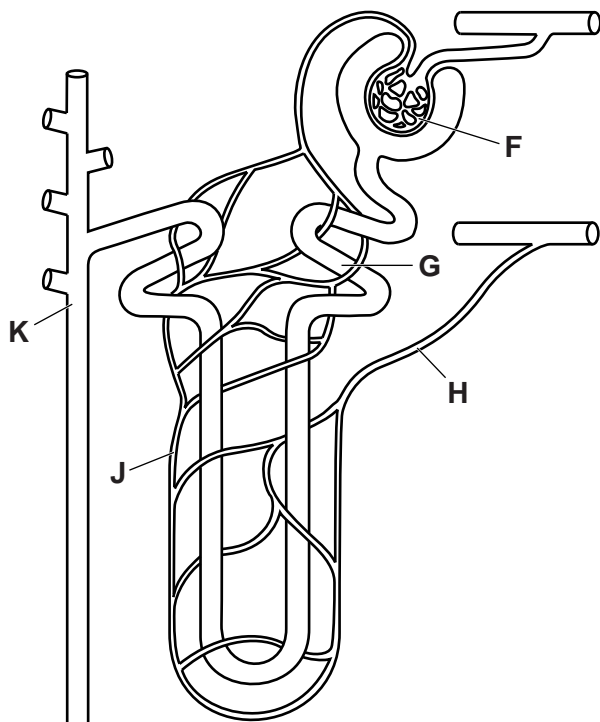


Fig. 7.1

- (a) Using the letters on Fig. 7.1, state the regions where each of the following takes place.

In each case, choose **one** letter from Fig. 7.1 and write it in the box in Table 7.1. You must put **one** letter in each box. You may use the same letter more than once.

Table 7.1

filtration

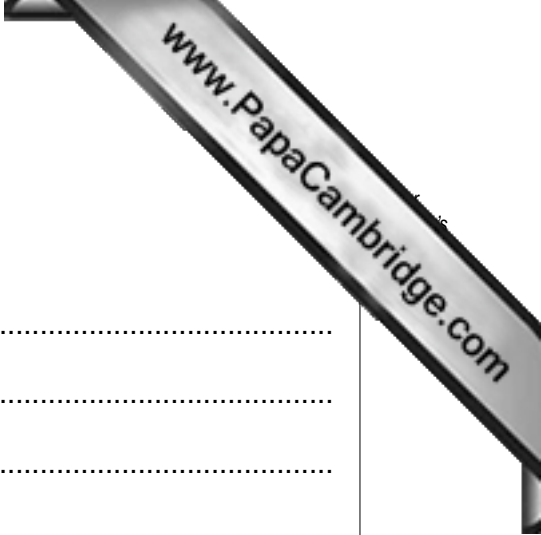
reabsorption of glucose

reabsorption of salts

reabsorption of urea

reabsorption of water





(b) Describe the process of:

(i) reabsorption of glucose from the kidney tubule,

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.....[4]

(ii) reabsorption of water from the kidney tubule.

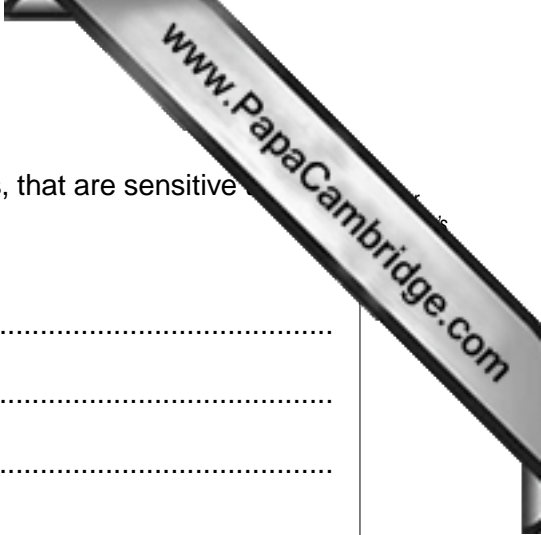
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.....  
.....[3]

(c) Suggest how some substances, such as drugs not normally found in the body, are removed by the body.

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.....  
.....[3]

[Total: 15]





In the retina of the eye there are two types of cells, rods and cones, that are sensitive

(c) State **three** ways in which rods differ from cones.

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.....  
.....  
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.....  
.....  
..... [3]

(d) After light strikes a cone in the retina, information passes from one neurone to another.  
Describe how this happens.

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..... [4]

[Total: 15]

## Section C

Answer **either** question 9 or question 10.

Write your answers in the spaces provided.

9 A number of chemical substances are used in controlling the spread of diseases.

(a) Explain what is meant by the term *antibiotic*.

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[5]

(b) Distinguish between an antiseptic and a disinfectant.

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[5]







