Centre Number	Candidate Number	Name

UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
General Certificate of Education Ordinary Level

HUMAN AND SOCIAL BIOLOGY **5096/02**

Paper 2

May/June 2004

2 hours

Additional Materials: Answer Paper

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.
You may use a soft pencil for any diagrams, graphs or rough working.
Do not use staples, paper clips, highlighters, glue or correction fluid.

Section A
Answer **all** questions.
Write your answers in the spaces provided on the question paper.
You are advised to spend no longer than 1 hour on Section **A**.

Section B
Answer **all** the questions, including questions 8, 9 and 10 **Either** or 10 **Or**.
Write your answers to questions 8, 9 and 10 on the separate answer paper provided.
At the end of the examination,
1. fasten all your work securely together;
2. write an E (for Either) or an O (for Or) next to the number 10 in the grid below to indicate which question you have answered.

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

If you have been given a label, look at the details. If any details are incorrect or missing, please fill in your correct details in the space given at the top of this page.

Stick your personal label here, if provided.

For Examiner's Use	
1	
2	
3	
4	
5	
6	
7	
Section A	
8	
9	
10	
TOTAL	

This document consists of **12** printed pages.

For Examiner's Use

Section A

Answer **all** the questions.

Write your answers in the spaces provided.

1

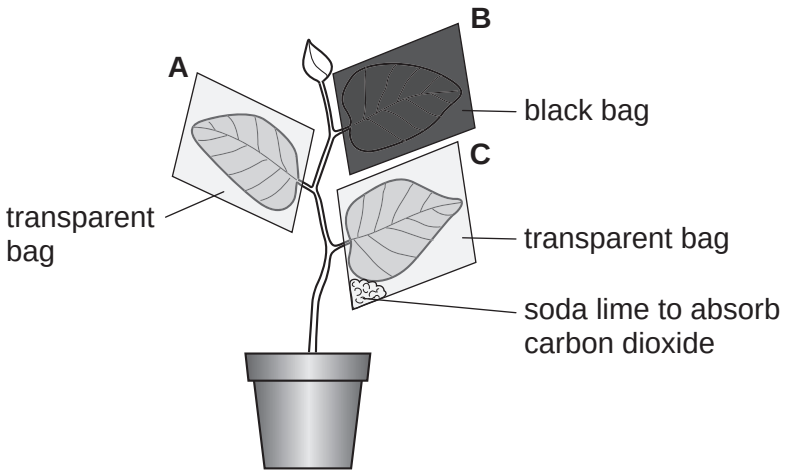

Fig. 1.1

(a) A well-watered potted plant was set up as shown in Fig. 1.1 and placed in bright sunlight for two hours. Only leaf **A** was found to have made starch during the two hours.

(i) Name the process that formed the starch in leaf **A**. .....[1]

(ii) Explain why no starch was made in leaf **B** or in leaf **C**.

Leaf **B** .....

.....

Leaf **C** .....

.....[4]

(iii) Name the gas which collected in the bag around leaf **A** during the experiment.

..... [1]

(b) In order to make proteins from their carbohydrates, plants must have a supply of nitrogen. This is usually absorbed from the soil as nitrate ions.
Fig. 1.2 shows some of the processes affecting the amount of nitrate ions in the soil.

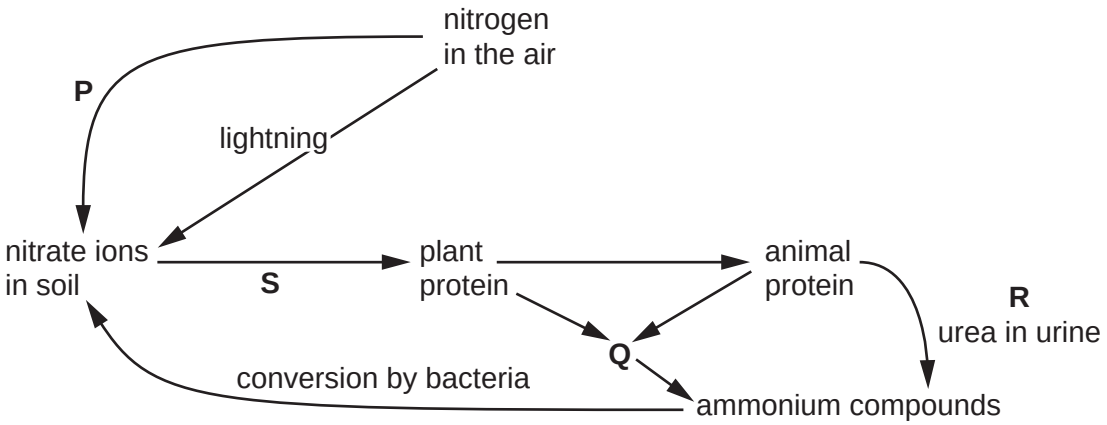

Fig. 1.2

Identify processes **P**, **Q**, **R** and **S** from the terms given below.

decay of animals and plants *excretion* *nitrogen-fixation* *photosynthesis* *respiration* *uptake by plants*

P .....

Q .....

R .....

S .....

[4]

[Turn over

(c) Fig. 1.3 is a graph showing the effects of nitrogen fertilisers on crop yields.

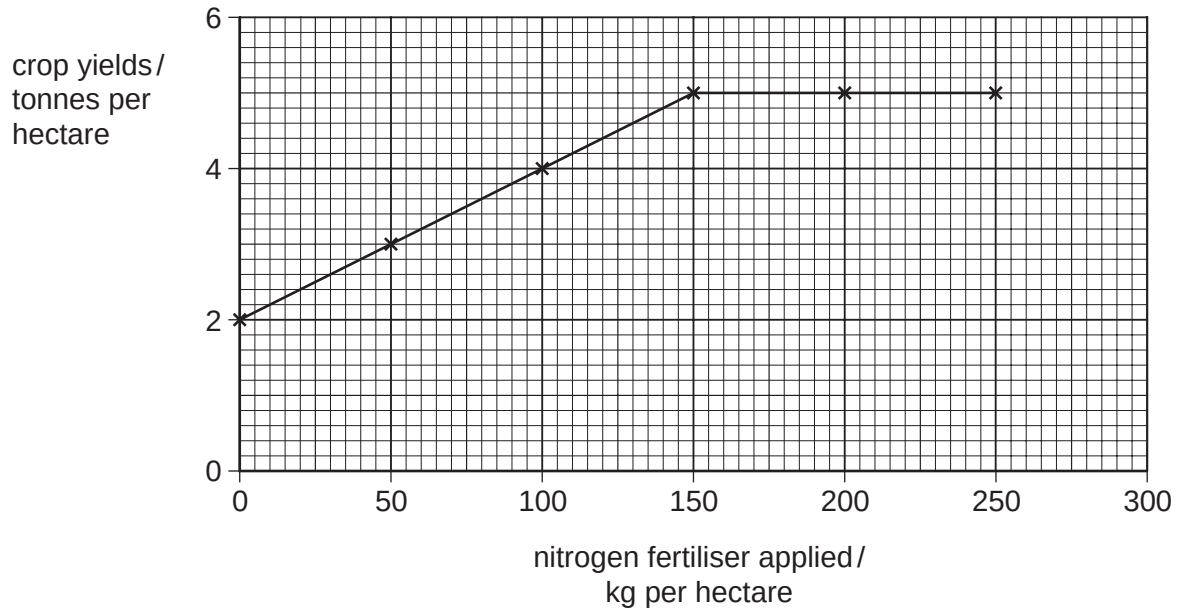

Fig. 1.3

Using the information in Fig. 1.3, describe the effects of increasing amounts of nitrogen fertiliser on crop yield.

.....

.....

.....

.....

.....[4]

(d) Table 1.1 compares the average composition of 100 g samples of several different foods from both plants and animals.

Table 1.1

foods / 100 g	energy / kJ	carbo-hydrates / g	protein / g	fat / g	vit. A / μg	vit. C / mg	vit. D / μg	iron / mg	fibre
cereals	1500	70.0	10.0	2.5	0	0	0	35.0	high
vegetables	85	3.6	1.5	0	900	33	0	0.8	high
meat	525	0.1	18.0	6.0	20	2	0.2	60.0	0
eggs	620	0.1	12.5	11.0	140	0	2.0	1.0	0
milk	300	5.0	3.0	4.5	40	4	0.1	0.1	0

Using the information given in Table 1.1,

(i) state the vitamin listed in the table that would not be present in the foods from plants;

..... [1]

(ii) state how much milk would have to be consumed in order to provide the same energy as 100 g of cereals;

..... g [1]

(iii) give three reasons why a diet consisting entirely of milk would not be suitable for an adult;

1. .....

2. .....

3. .....[3]

(iv) state which one of the vitamins listed in the table would help most in the healing of wounds.

..... [1]

[Total : 20]

For Examiner's Use

2 Fig. 2.1 shows the rate of heart-beat and the volume of blood pumped by the heart. A period of rest was followed by a period of exercise and then another period of rest.

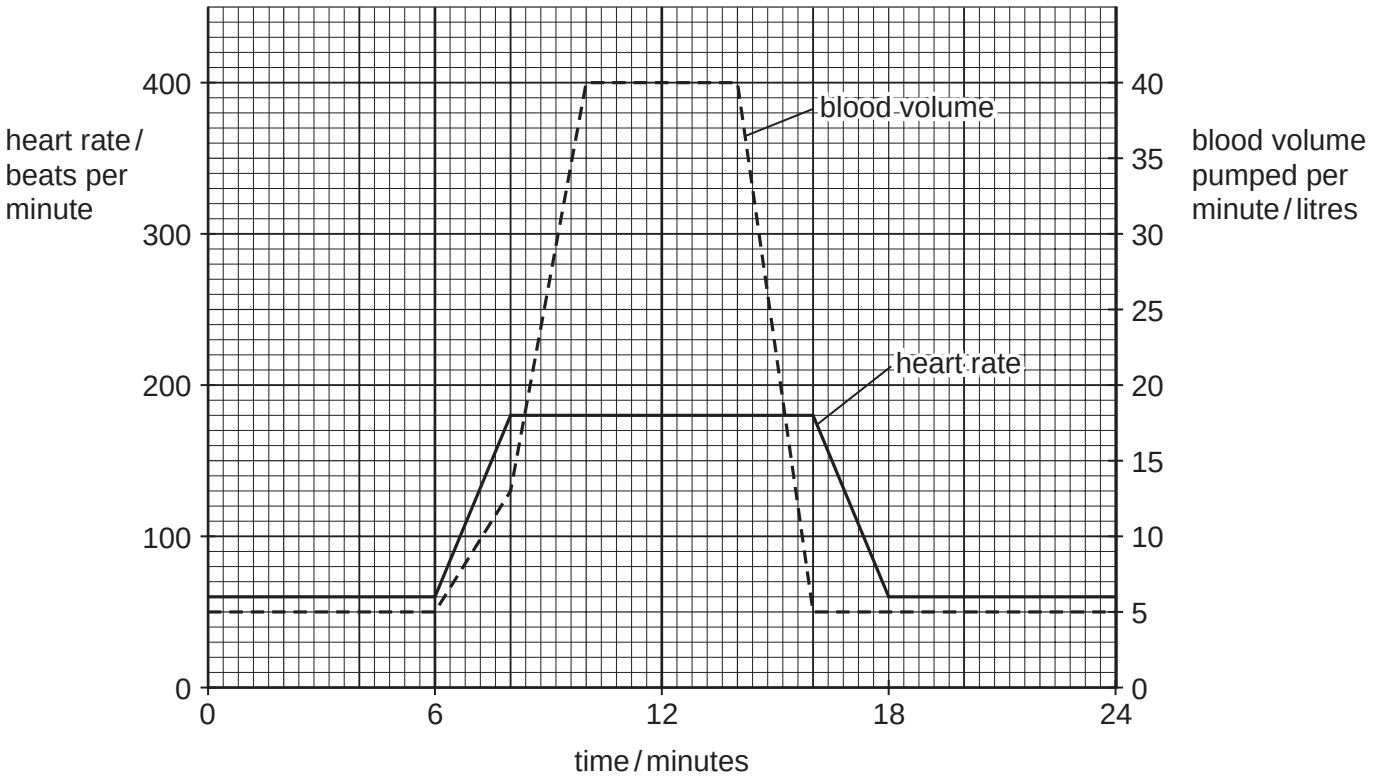

Fig. 2.1

(a) How long did it take from the beginning **of the period of exercise** for the following to reach their maximum values?

1. heart-rate ..... min.

2. blood volume pumped per min. ..... min. [2]

(b) Heart rate increased by three times during exercise, over its value at rest. Calculate by how many times the blood volume pumped per minute before exercise increased during exercise.
Show your working.

.....

.....[2]

(c) During exercise, blood flow to the muscles is increased. Explain why muscles require more blood during exercise.

.....

.....

.....

.....[3]

[Total : 7]

3 Fig. 3.1 shows the life cycle of a species of *Schistosoma*.

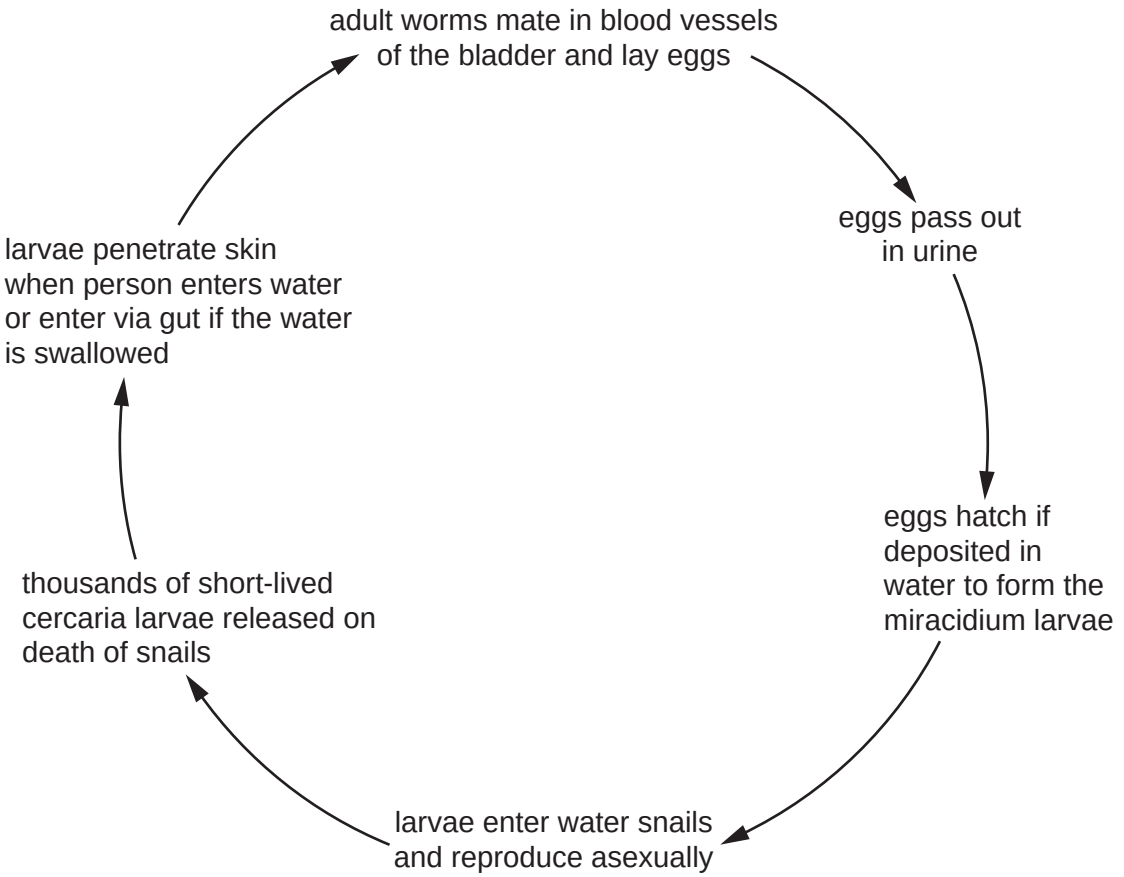

Fig. 3.1

(a) Using Fig. 3.1, suggest three ways by which the spread of *Schistosoma* can be reduced.

1. .....

2. .....

3. .....[3]

(b) Explain how the following adaptations increase the *Schistosoma's* chances of success.

1. Cercaria larvae are released from the snail during daylight hours.

.....

.....[2]

2. Adult worms coat themselves with molecules taken from the host's red blood cells.

.....

.....[1]

(c) A course of drugs can kill the worms in people, but the disease remains widespread. Suggest a reason for this.

.....

.....[1]

[Total : 7]

[Turn over

4 Table 4.1 summarises typical daily gains and losses of water in a person living in Britain.

Table 4.1

water gain / litre		water loss / litre	
food	0.75	sweating	0.50
drinks	1.50	lungs	0.38
metabolic water	0.25	faeces	0.12
		urine	.....
total	2.50		2.50

(a) **(i)** Calculate the volume of water lost in the urine and enter it into Table 4.1. [1]

(ii) Where in the gut is most water absorbed? .....[1]

(b) Metabolic water is produced during respiration. Complete the following word equation to show this.

glucose + ... = ... + ... + energy release. [2]

(c) In what ways would heavy exercise alter these figures for **water loss** in the table?

1. lungs .....

2. urine .....[2]

[Total : 6]

5 Fig. 5.1 shows how an experiment was set up to find out the effects of pH on the activity of salivary amylase.

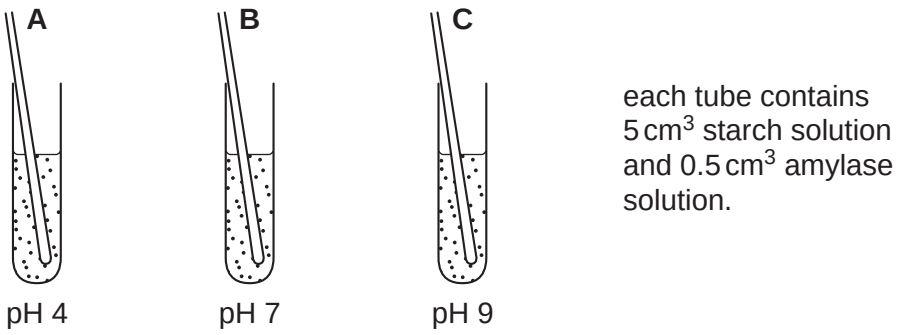

Fig. 5.1

Each tube was set up and its pH adjusted to the value shown. The amylase solution was added to each tube at the same time to begin the reaction. At one minute intervals a drop of solution was taken from each tube and added to a drop of iodine solution on a white tile. The results are shown in Fig. 5.2 below.

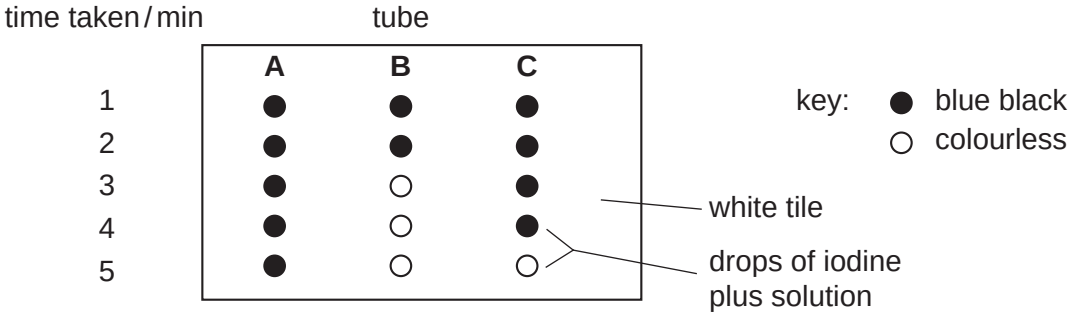

Fig. 5.2

(a) Explain fully the results in each of the three tubes A, B and C.

A .....

.....

B .....

.....

C .....

.....[6]

(b) This experiment was performed at 20 °C. Suggest how long tube B would have taken to complete the reaction, if the temperature had been 30 °C.

..... min. [1]

[Total : 7]

6 Fig. 6.1 shows part of the arm and shoulder.

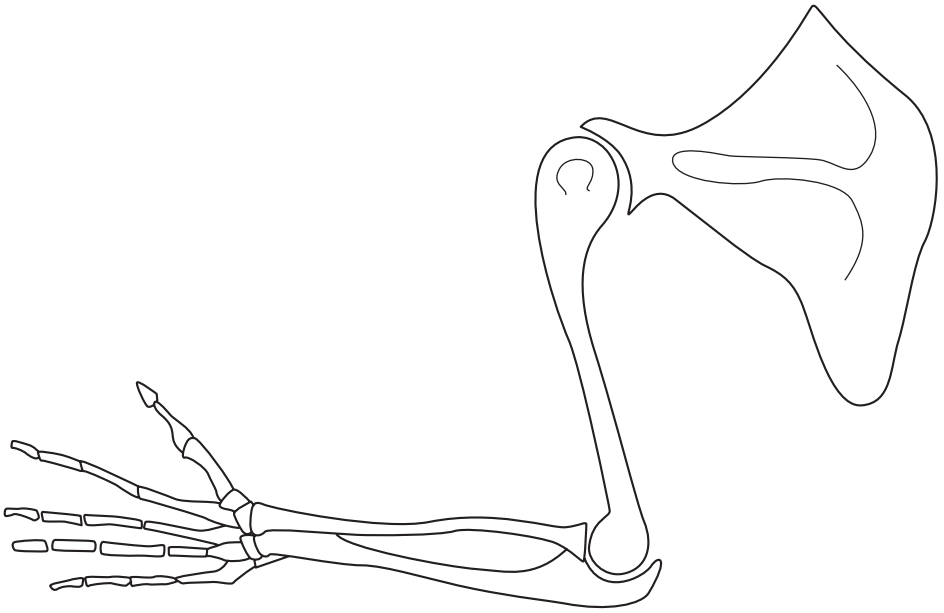

Fig. 6.1

On Fig. 6.1, use label lines and numbers **1** to **4** to identify:

1 one hinge joint,

2 one ball and socket joint,

3 a place where blood cells are made,

4 a place where cartilage may be found. [4]

[Total : 4]

7 Fig. 7.1 shows two cells, **V** and **W**, one dividing by mitosis, the other by meiosis.

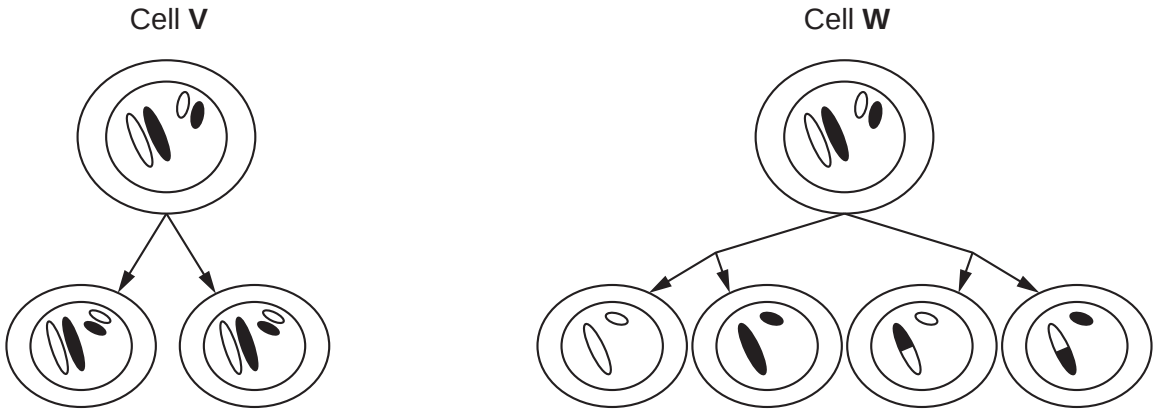

Fig. 7.1

(a) Use Fig. 7.1 to state three ways in which meiosis differs from mitosis.

1. .....

.....

2. .....

.....

3. .....

.....[3]

(b) Cell **W** is from a man. State the name of the cells he forms by meiosis.

.....[1]

[Total : 4]

Section B

Answer **all** the questions, including questions 8, 9 and 10 **Either** or 10 **Or**.

Write your answers on the separate answer paper provided.

8 **(a)** Describe what happens during the process of breathing in. [7]

(b) Name the pathogen that causes tuberculosis and explain how it is spread through air. [3]

(c) Explain how the risk of catching tuberculosis may be reduced. [3]

(d) Explain the role of mass X-ray in the fight against tuberculosis. [2]

9 **(a)** Describe the parts played by the **ovary** and **oviduct** in the process of reproduction. [6]

(b) Describe how oxygen from the air reaches the tissues of the fetus. [5]

(c) Explain how the fetus is protected from physical damage while in the uterus. [4]

Question 10 is in the form of an **Either / Or** question. Only answer question 10 **Either** or question 10 **Or**.

10 Either

(a) Explain the dangers to human health when sewage is left untreated. [5]

(b) Car exhaust contains oxides of nitrogen. State **two** other pollutants from car exhaust and for each one explain why it is damaging to health. [6]

(c) Describe how you would test a sample of water to see if it contained bacteria. [4]

Or

(a) Explain how the body prevents glucose levels in the blood from rising too high after a meal. [5]

(b) State **two** chemical substances that enter the kidney in the blood and for each one explain what happens to it in the kidney. [6]

(c) Describe how you would test a sample of urine for glucose. [4]