



UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS  
General Certificate of Education Ordinary Level

CANDIDATE  
NAME

CENTRE  
NUMBER

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**HUMAN AND SOCIAL BIOLOGY**

**5096/02**

Paper 2

**October/November 2007**

**2 hours**

Additional Materials: Answer Booklet/Paper.

**READ THESE INSTRUCTIONS FIRST**

If you have been given an Answer Booklet, follow the instructions on the front cover of the Booklet.  
Write your Centre number, candidate number and name on all the work you hand in.  
Write in dark blue or black pen on both sides of the paper.  
Do not use staples, paper clips, highlighters, glue or correction fluid.  
**DO NOT WRITE IN ANY BARCODES.**

**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.  
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.

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	
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<b>Section A sub-total</b>	
8	
9	
10	
<b>Total</b>	

This document consists of **14** printed pages and **2** blank pages.



**Section A**

Answer **all** the questions.

Write your answers in the spaces provided.

- 1 The three major nutrients are carbohydrates (sugars and starches), lipids (fats and oils) and proteins. Carbohydrates and lipids contain carbon, hydrogen and oxygen.
- (a) Name the additional element in all proteins. ....[1]
- (b) Table 1.1 shows the results of some tests carried out on three foods, **A**, **B** and **C**.

**Table 1.1**

test	Food A	Food B	Food C
add biuret solution	violet solution	violet solution	blue solution
boil with Benedict's solution	blue solution	blue solution	red solution
add iodine solution	brown colour	brown colour	black colour
rub onto paper, dry	no clear spot	clear spot	no clear spot

Using the information in Table 1.1, state the food or foods that contain

protein, .....

protein **and** lipid, .....

**only** carbohydrate. ....[4]

- (c) The apparatus shown in Fig. 1.1 can be used to give a measure of the energy content of a food sample. The sample is fixed onto a mounted needle, set alight and held under the large tube of water, until it finishes burning. The temperature of the water is taken before and after burning the food.

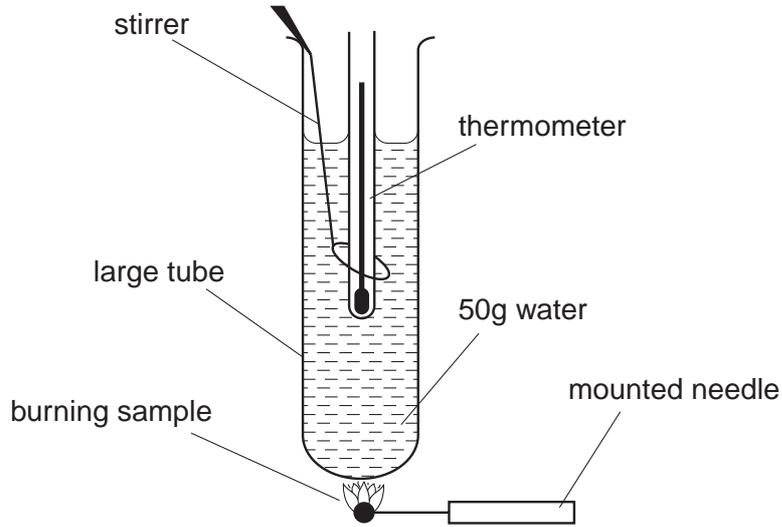


Fig. 1.1

Explain why the water is stirred before reading the temperature.

.....[1]

- (d) It takes 4.2 joules to raise the temperature of 1 gram of water by 1 °C. In the experiment shown in Fig. 1.1, the water temperature rose from 20 to 50 °C. Calculate the energy content in joules of the food sample used.

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

- (e) A student looked up in a textbook the actual energy content of the food used in this experiment. The energy content was found to be more than twice the value found in the experiment. How do you explain this?

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

- (f) Table 1.2 shows the energy requirements of people of different ages in a warm climate, measured in kilojoules per kilogram of body mass.

**Table 1.2**

age/years	energy required/kJ per kg
0–1	460
1–3	420
4–9	340
10–19 female	210
10–19 male	240
25–50 adult female	170
25–50 adult male	190
60–80 elderly male	150

Explain the different energy requirements between the following pairs in the table:

1. the male at 25–50 and the male at 60–80,

.....

.....

.....

2. the child at 0–1 and that at 4–9,

.....

.....

.....

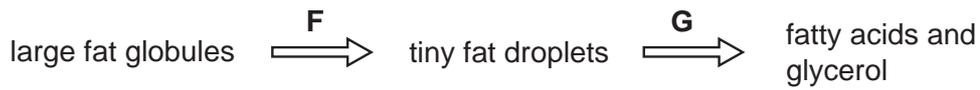
3. the male at 25–50 and the female at 25–50, even if both are doing the same jobs.

.....

.....

.....[4]

(g) Fig. 1.2 shows stages in the digestion of fat in the small intestine.



**Fig. 1.2**

(i) Name substances **F** and **G** which bring about the changes shown.

**F** = .....

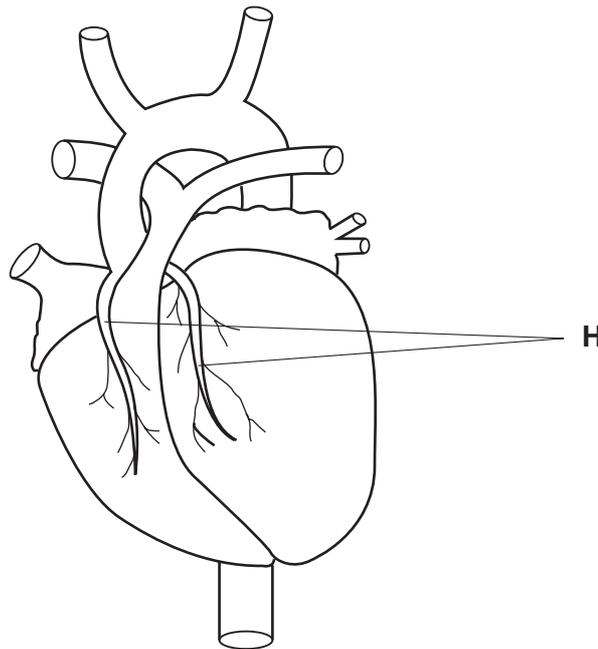
**G** = .....[2]

(ii) Name the organs which **make F** and **G**.

**F** = .....

**G** = .....[2]

(h) Too much fat in the diet can lead to the blocking of arteries by fatty deposits.  
Fig. 1.3 shows the heart in exterior view.



**Fig. 1.3**

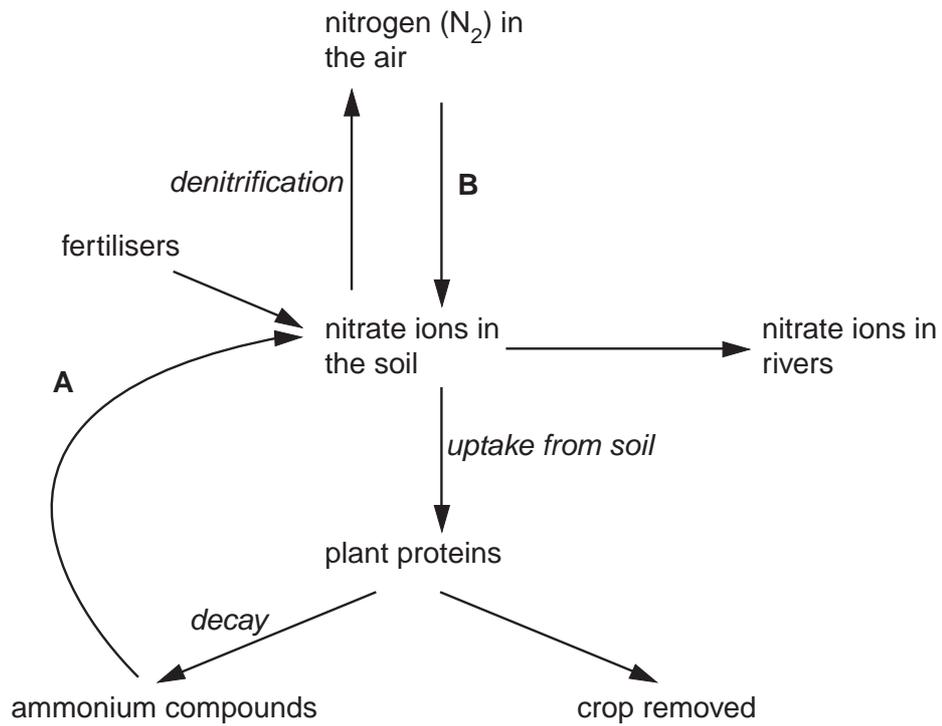
(i) Name the arteries labelled **H**. .....[1]

(ii) Explain why blocking these arteries can cause a heart attack.

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

[Total: 20]

- 2 (a) Fig. 2.1 shows the cycling of nitrogen through a field in which a crop of maize is growing.



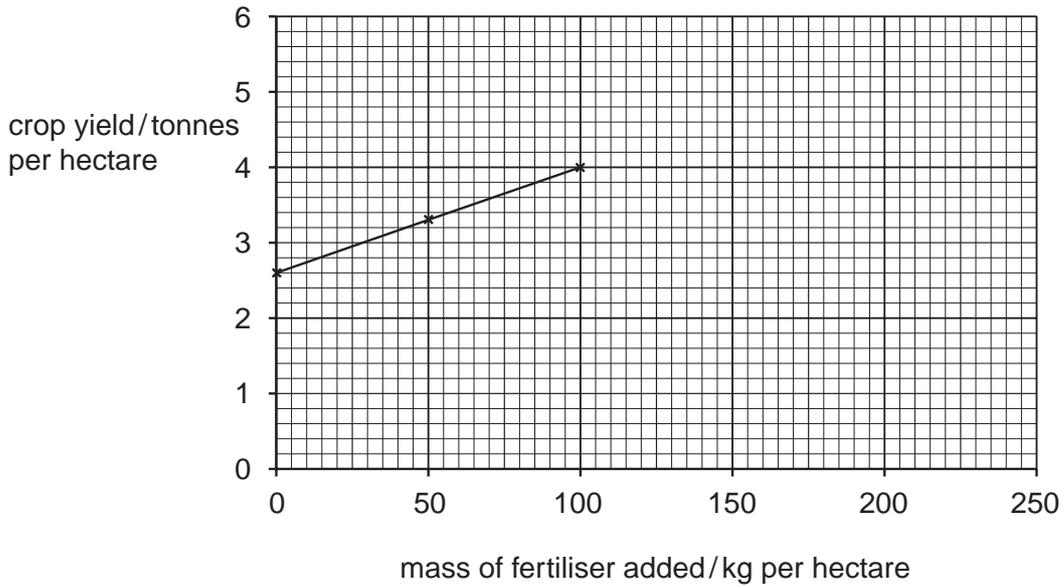
**Fig. 2.1**

Name the bacterial processes **A** and **B** which increase nitrate ions in the soil.

**A** = .....

**B** = .....[2]

- (b) Fig. 2.2 shows the effects of increasing quantities of nitrogen fertiliser on crop yield. Three points have been plotted for you.



**Fig. 2.2**

- (i) Complete the graph by using the information in Table 2.1 below. [1]

**Table 2.1**

mass of fertiliser added/kg per hectare	crop yield/tonnes per hectare
150	4.7
200	4.8

- (ii) Using Fig. 2.2, describe the effect of adding increasing quantities of nitrogen fertiliser to this crop.

.....

.....

.....

..... [3]

[Total: 6]

3 Fig. 3.1 shows a synapse between two neurones.

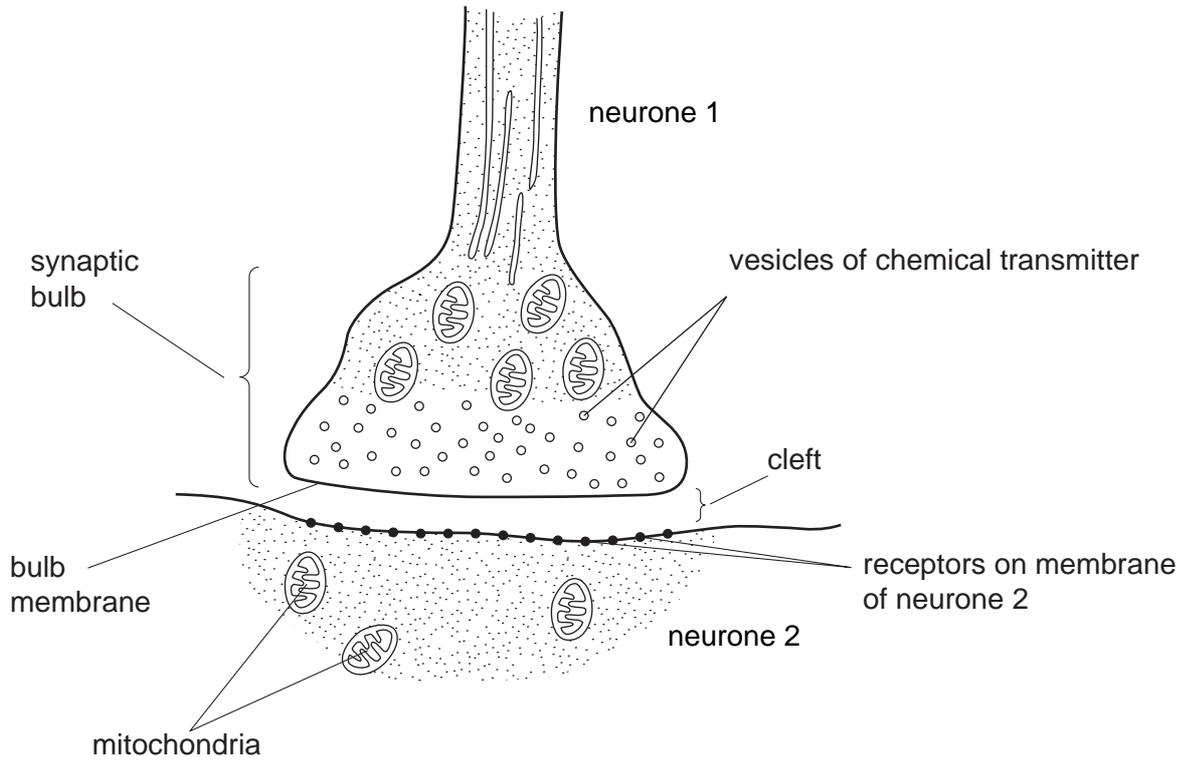


Fig. 3.1

When an impulse arrives in neurone 1,

- vesicles of chemical transmitter fuse with the bulb membrane
- vesicles release chemical transmitter into the cleft between the two neurones
- this chemical transmitter diffuses across the cleft
- chemical transmitter fuses with receptors on the membrane of neurone 2
- this triggers impulses to be transmitted down neurone 2

(a) Using the information given above, explain why

(i) such chemical transmission is **one-way**, from neurone 1 to neurone 2,

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

(ii) there is a small time-delay at each synapse.

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

(b) State the evidence that you can see in Fig. 3.1 to suggest that the cell uses energy to make the transmitter.

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

[Total: 4]

4 Living bone consists of bone cells plus the matrix they secrete. The matrix consists of tough collagen fibres and hard calcium salts. Fig. 4.1 shows what happens when a bone is treated in two different ways.

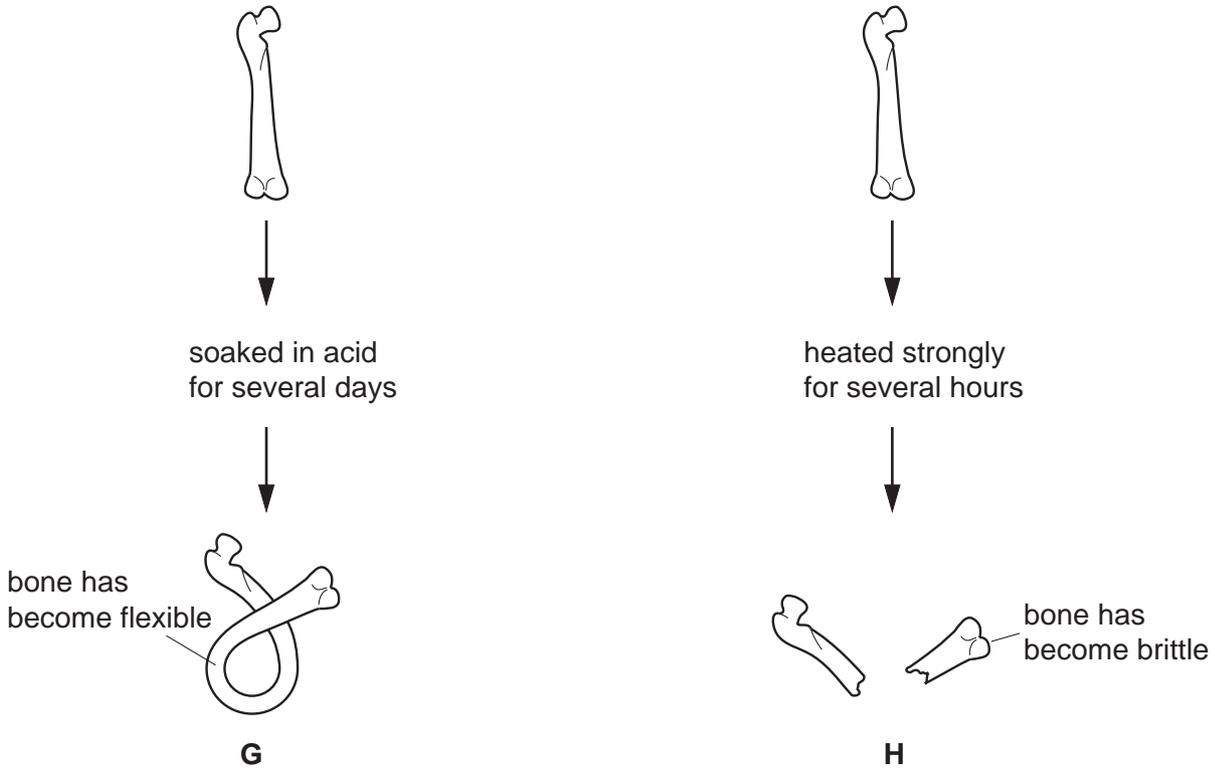


Fig. 4.1

(a) Explain the changes seen in **G** and **H**.

**G** .....  
.....[2]

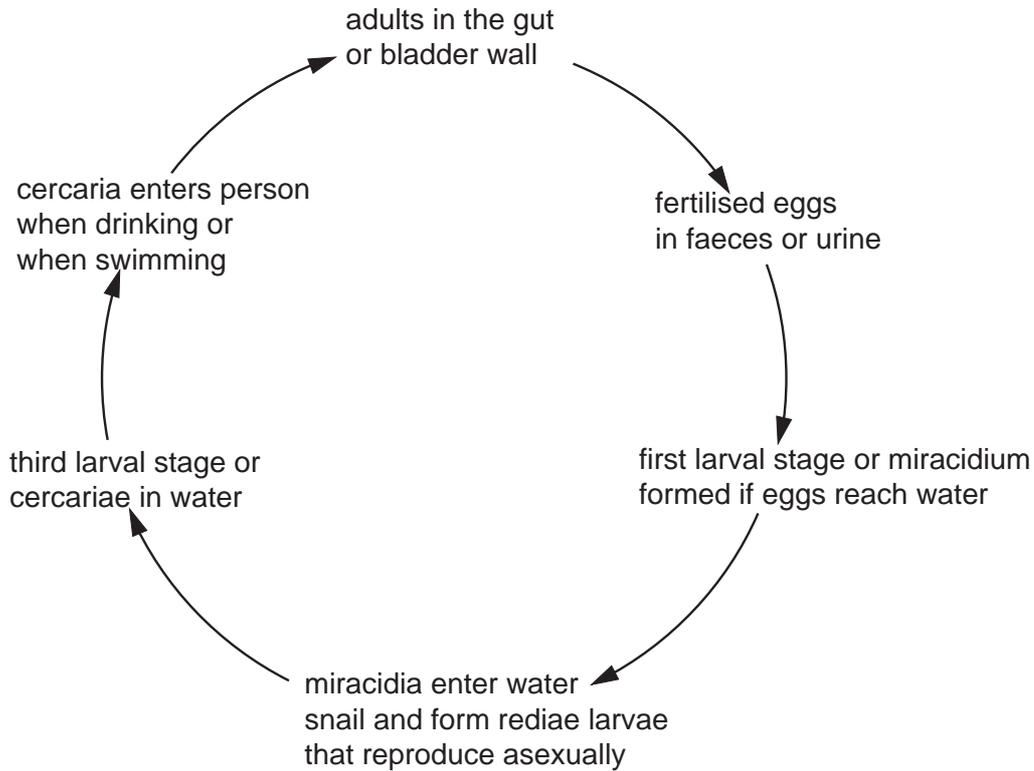
**H** .....  
.....[2]

(b) State two advantages of bone having living cells.

1.....  
2.....[2]

[Total: 6]

5 Fig. 5.1 shows the life cycle of *Schistosoma*, a blood fluke living in the blood vessels of the human gut or bladder.



**Fig. 5.1**

(a) Using Fig. 5.1, suggest three ways to reduce the spread of the disease.

- 1. ....
- 2. ....
- 3. ....[3]

(b) Many people become infected around the ages of 5 or 6. Suggest why this may happen.

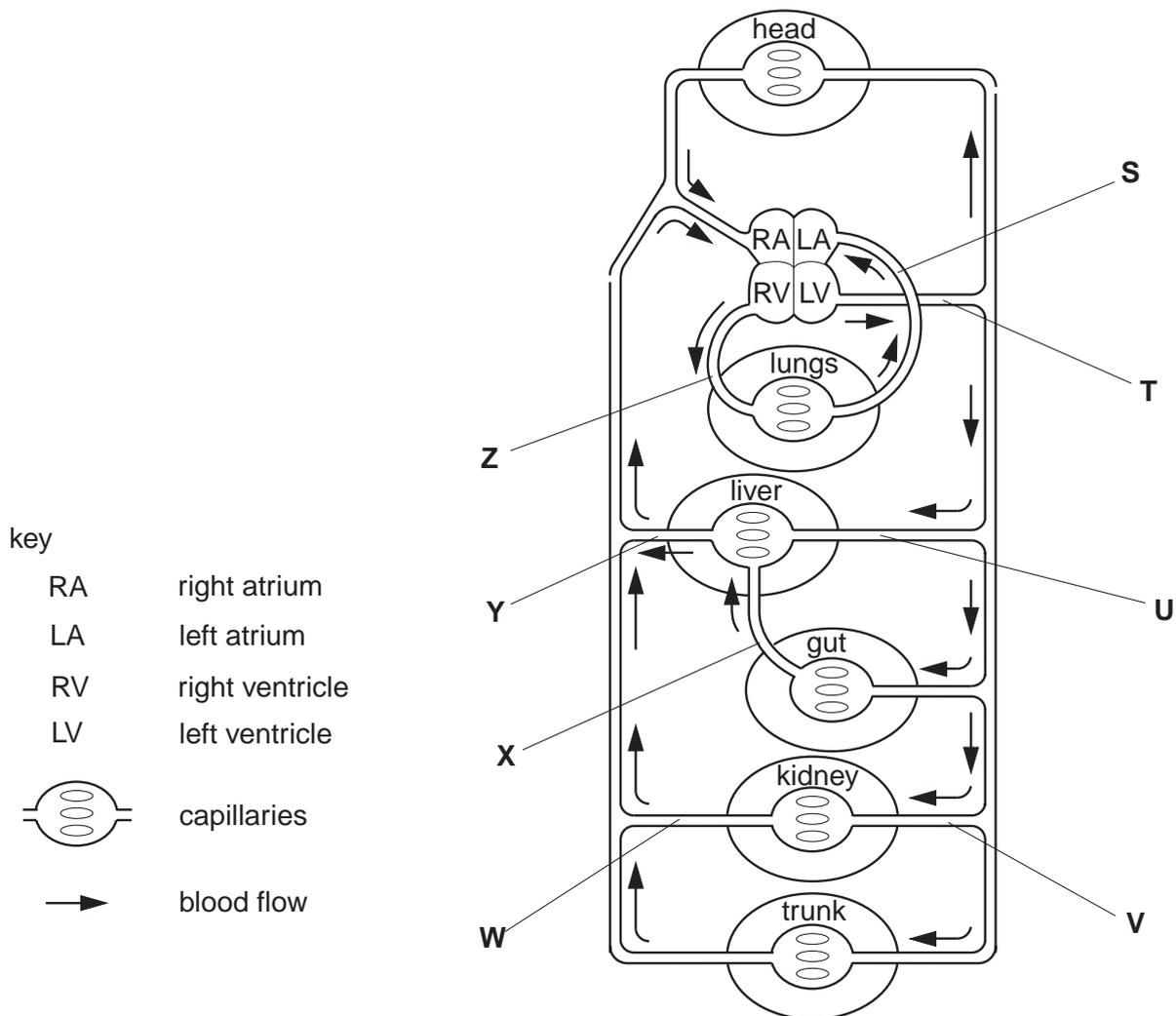
.....[1]

(c) Suggest why there are different larval stages in the life cycle.

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

[Total: 6]

6 Fig. 6.1 is a diagram of the major blood vessels, **S** to **Z**, connecting the body organs.



- key
- RA right atrium
  - LA left atrium
  - RV right ventricle
  - LV left ventricle
  -  capillaries
  -  blood flow

Fig. 6.1

(a) Give the **letter** of the blood vessel labelled **S** to **Z** in Fig. 6.1 that contains the

- (i) least urea, .....
- (ii) most glucose after a meal, .....
- (iii) least carbon dioxide, .....
- (iv) most oxygen, .....
- (v) highest pressure. ....

[5]

(b) Using **only** information from Fig. 6.1,

(i) describe how the blood supply **to** the liver differs from that to the kidneys,

.....[1]

(ii) suggest a reason why the blood supply **to** the liver differs from that to the kidneys.

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

[Total: 7]

7 Fig. 7.1 shows the sequence of events that take place in the blood when the skin is cut.

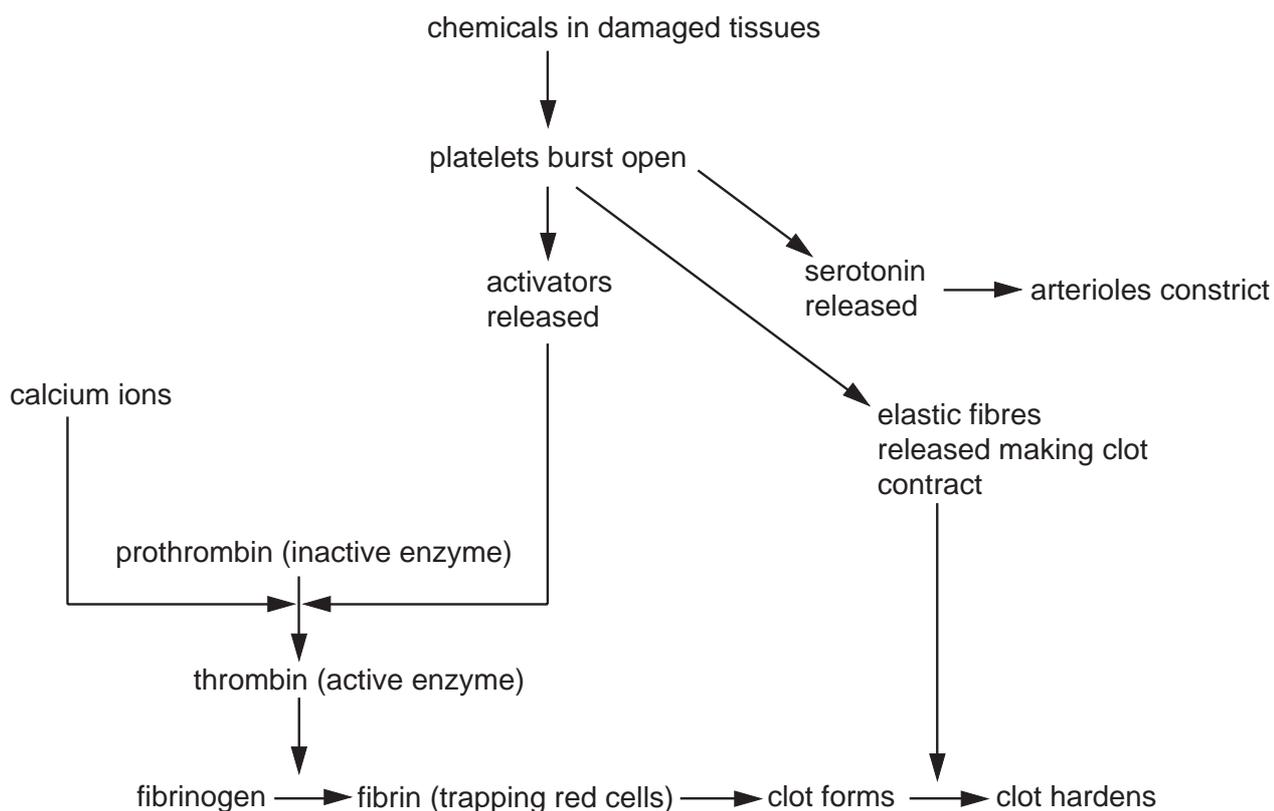


Fig. 7.1

(a) Using **only** information from Fig. 7.1, state the two end-results of this sequence that help to prevent blood-loss.

1. ....
2. ....[2]

(b) Some people have low numbers of platelets. Give one reason why this will lengthen the time it takes for their blood to clot.

.....[1]

(c) Blood that is to be stored for use in later transfusions has its calcium ions removed and is chilled.

How will these steps help to prevent clotting in storage?

1. removal of calcium ions .....[1]

2. chilling .....[2]

[Total: 6]

## 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 how large quantities of sewage from a town are made harmless before discharge into a river. [11]
- (b) Fig. 8.1 shows sections through two pit latrines, **K** and **L**. **L** is an improved version of **K**.

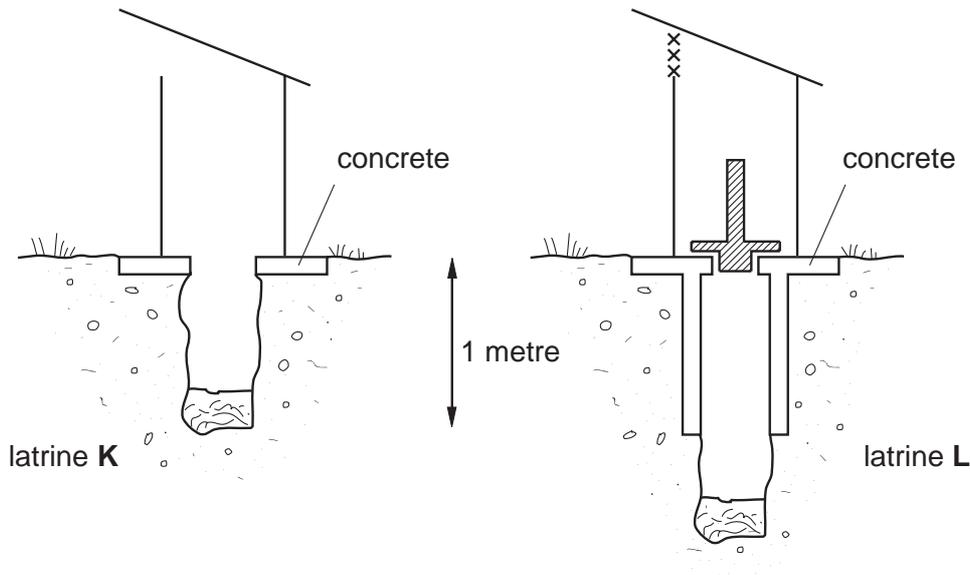
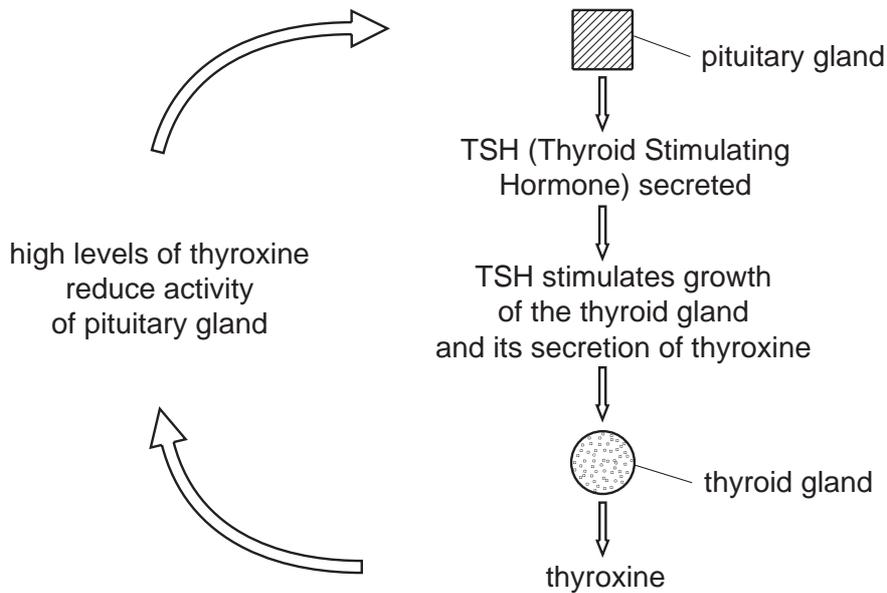


Fig. 8.1

List **four** ways in which latrine **L** differs from **K**. Explain why each difference is an improvement. [4]

- 9 (a) Using **named** examples, explain each of the following statements about hormones.
- A hormone is made in one place in the body, but has its effects in another.
  - Some hormones are quick-acting, while others are slow-acting.
  - Some hormones operate all our lives, while others may have their effects for a period only. [10]
- (b) Since hormones are powerful regulators of body chemistry, their levels in the body must be carefully controlled. Fig. 9.1 shows how the amount of thyroxine, a hormone regulating respiration, is controlled by the pituitary gland which monitors the concentration of thyroxine in the blood. The pituitary gland secretes a hormone known as TSH (Thyroid Stimulating Hormone).



**Fig. 9.1**

Using Fig. 9.1, suggest what will happen in this system if thyroxine concentrations rise too high. [5]

**10 Either**

- (a) The following substances are present in the blood. Describe what happens to each of these in the kidney.
- protein
  - glucose
  - urea
  - water. [10]
- (b) Explain how the kidney helps to save water if a person is sweating heavily. [5]

**10 Or**

- State **three** similarities between the egg (ovum) and the sperm. [3]
- State the differences between fertilisation and implantation. [5]
- The placenta prevents maternal and fetal bloods from mixing. State why this is necessary. [3]
- Explain why mothers who smoke when they are pregnant are likely to have smaller babies. [4]



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