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## 5096/21

**May/June 2010**

**2 hours**

No Additional Materials are required.

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.**

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.

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

Write your answers to questions 8, 9 and 10 in the spaces provided on the question paper.

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                   |  |  |
| 3                   |  |  |
| 4                   |  |  |
| 5                   |  |  |
| 6                   |  |  |
| 7                   |  |  |
| Section A sub-total |  |  |
| 8                   |  |  |
| 9                   |  |  |
| 10                  |  |  |
| Total               |  |  |

This document consists of **23** printed pages and **1** blank page.

Section A

Answer **all** questions in this section.

Write your answers in the spaces provided.

- 1 Fig. 1.1 shows blood cells.

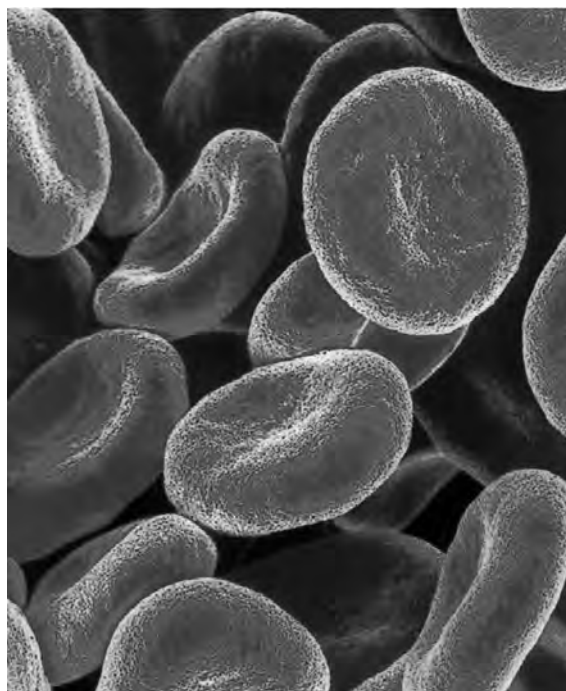


Fig. 1.1

- (a) Name the type of blood cell shown in Fig. 1.1 ..... [1]

- (b) Explain how the following help the blood cell to carry out its functions:

1. cell membrane,

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

2. size and shape.

.....  
.....  
.....  
.....  
..... [6]

- (c) Fig. 1.2 shows the same type of blood cell as that shown in Fig. 1.1, but this time person with sickle cell anaemia.



Fig. 1.2

- (i) With reference to Figs. 1.1 and 1.2, explain how the functioning of the blood may be affected by this condition.

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

- (ii) Sickle cell anaemia results from mutation and is controlled by a single gene with two alleles. The symbol **R** represents the normal (non-mutated) allele and the symbol **S** represents the sickle cell (mutated) allele. Using a genetic diagram, show how parents who do not suffer from full-blown sickle cell anaemia may produce a child who does suffer from this condition.

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

Fig. 1.3 shows a section through a small surface wound to the skin.

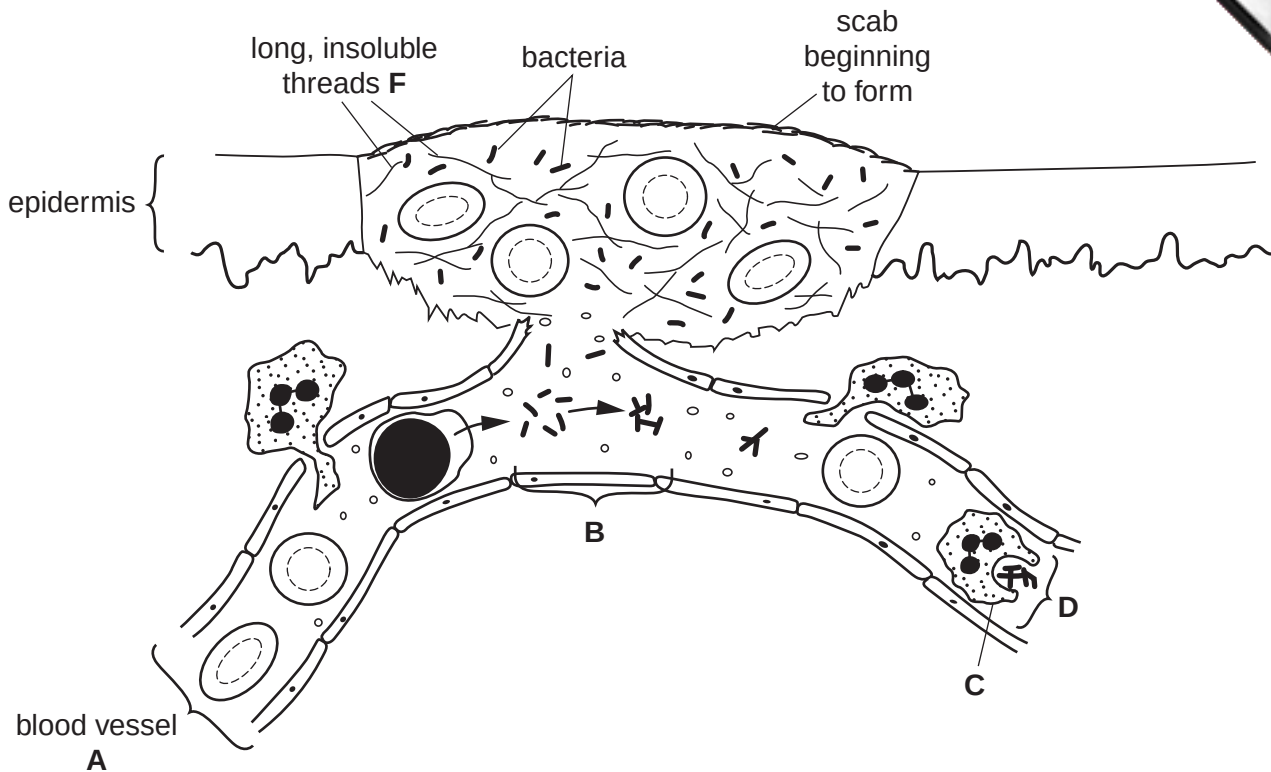


Fig. 1.3

(d) Name the type of blood vessel **A** and the cell **C** shown in Fig. 1.3.

**A** .....

**C** .....

[2]

(e) Explain what is happening to the bacteria in Fig. 1.3

(i) at **B**

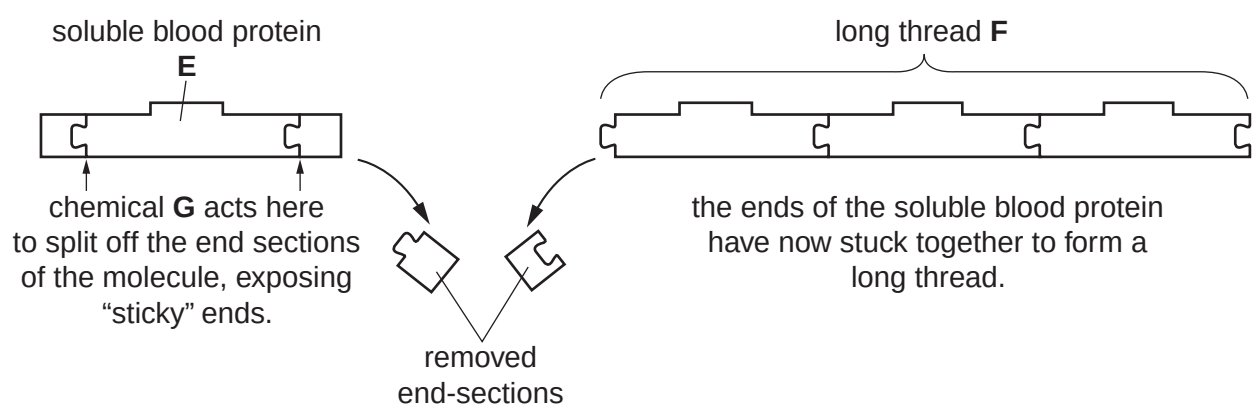
.....  
 .....

(ii) at **D**.

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

The long insoluble threads, **F**, shown in Fig. 1.3 are formed as the blood clots on a wound.

Fig. 1.4 shows how the insoluble threads are formed.

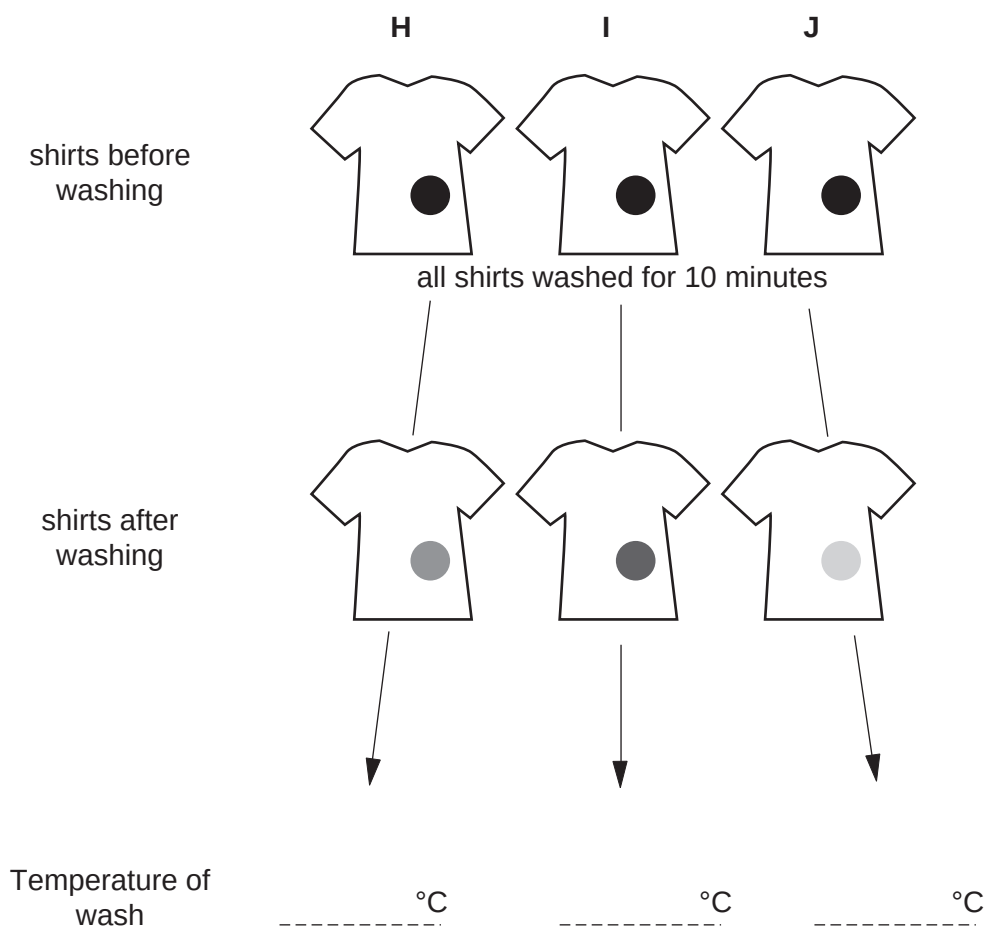


**Fig. 1.4**

- (f) (i) Name the soluble protein **E** ..... [1]
- (ii) Name the long insoluble thread **F** ..... [1]
- (iii) Suggest what type of chemical **G** is likely to be ..... [1]

[Total: 20]

- 2 Fig. 2.1 shows details of an experiment in which a washing powder was used to wash similar shirts, **H**, **I** and **J**, that had identical fat stains. The shirts were washed at three different temperatures, 15°C, 35°C and 65°C. The washing powder contained enzymes similar to those found in the human duodenum.



**Fig. 2.1**

- (a) (i) Complete Fig. 2.1 to show the temperature at which each shirt was washed. [2]
- (ii) Explain your answer for each of the shirts **I** and **J**.

shirt **I**

.....

.....

.....

shirt **J**

.....

.....

..... [2]

7

- (b) Suggest a change to the procedure that might have resulted in the complete removal of the stain from shirt J.

..... [1]

[Total: 5]

3 Fig. 3.1 shows structures involved in reflex actions.

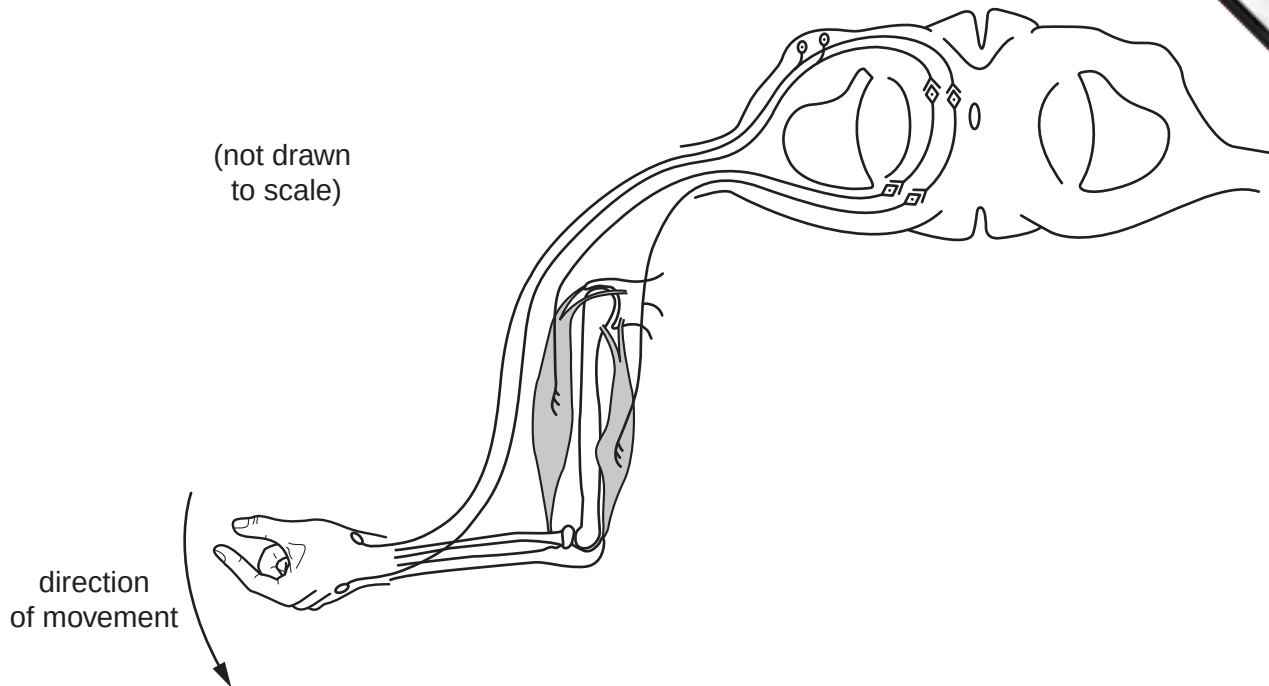


Fig. 3.1

(a) Explain why muscles are arranged as shown in Fig. 3.1.

.....

.....

.....

..... [3]

(b) As a result of a stimulus, the hand moves in the direction shown.

On Fig. 3.1,

(i) label the motor and sensory neurones used in this response, [2]

(ii) label and name the muscle responsible for moving the arm in the direction shown. [1]

(iii) Indicate, with an arrow and label, the place where a **named** suitable stimulus might be applied to produce this movement. [1]

[Total: 7]



- 4 (a) Table 4.1 shows the nutritional contents of  $100\text{cm}^3$  of two types of milk, full-fat and skimmed.  
(When milk is skimmed, the constituents that collect at the top of full-fat milk are removed.)

Table 4.1

|                | full-fat milk | skimmed milk |
|----------------|---------------|--------------|
| energy/kJ      | 275           | 156          |
| protein/g      | 3.4           | 3.6          |
| carbohydrate/g | 4.7           | 4.9          |
| fat/g          | 3.6           | 0.3          |
| sodium/g       | 0.1           | 0.1          |
| calcium/mg     | 119           | 124          |

Suggest why skimmed milk is believed to be better for an adult's circulatory system than full-fat milk.

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

- (b) Explain why a mother's milk is better for a baby than milk from another species of mammal, such as a goat.

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

[Total: 5]

- 5 Fig. 5.1 shows a building in a tropical country at night. The roof of the building has been drawn with part cut away to show a boy asleep.

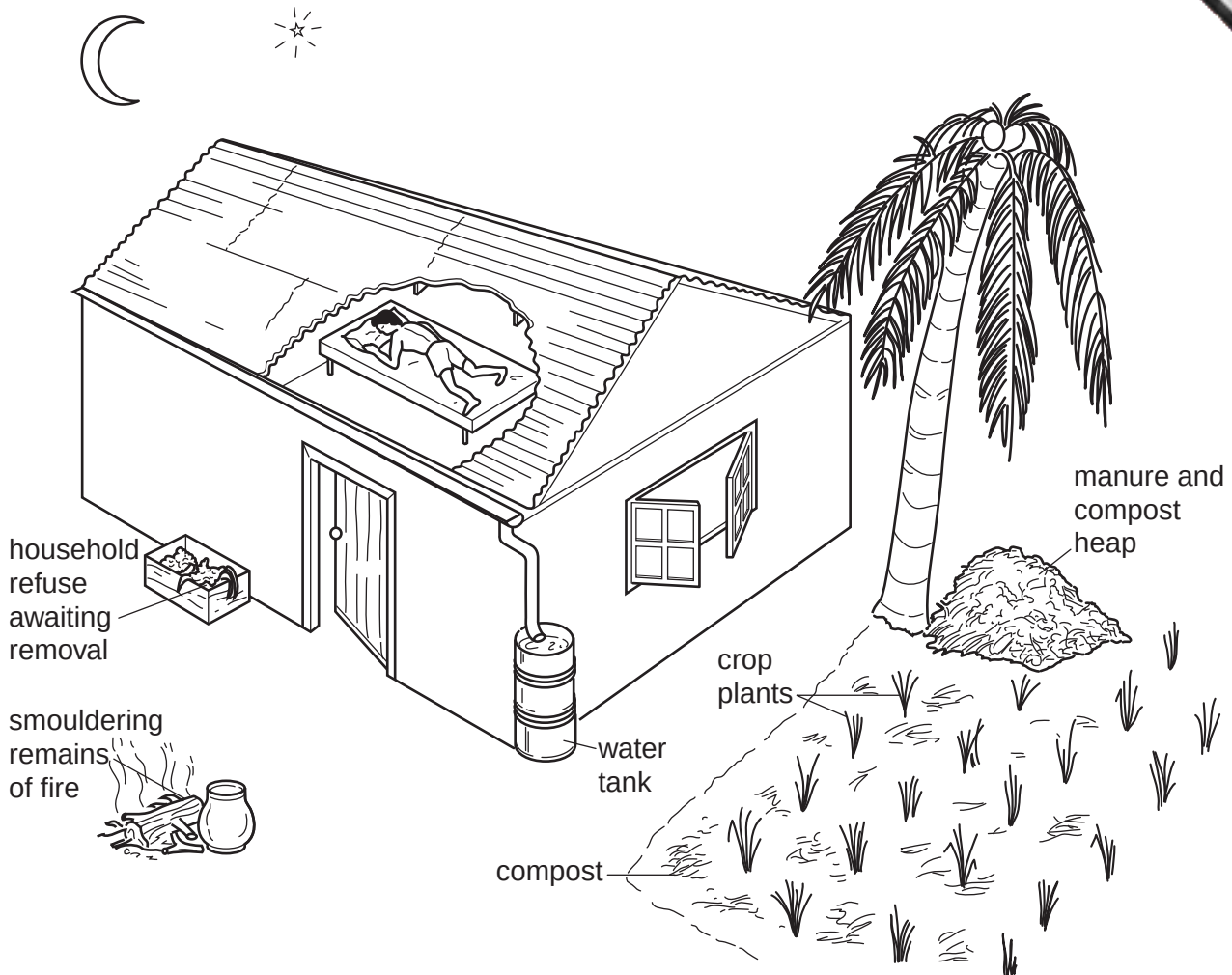


Fig. 5.1

- (a) (i) State an insect-borne disease that the boy is at risk of catching.

..... [1]

- (ii) Name the vector of the organism which causes this disease.

..... [1]

- (b) Complete the table to show **four** different precautions that the boy could take to reduce the risk of catching the disease. For each precaution, state how it gives protection.

|   | precaution taken | how it gives protection |
|---|------------------|-------------------------|
| 1 | .....<br>.....   | .....<br>.....          |
| 2 | .....<br>.....   | .....<br>.....          |
| 3 | .....<br>.....   | .....<br>.....          |
| 4 | .....<br>.....   | .....<br>.....          |

[4]

[Total: 6]

6 Fig. 6.1 shows the two layers of muscle moving food through the small intestine.

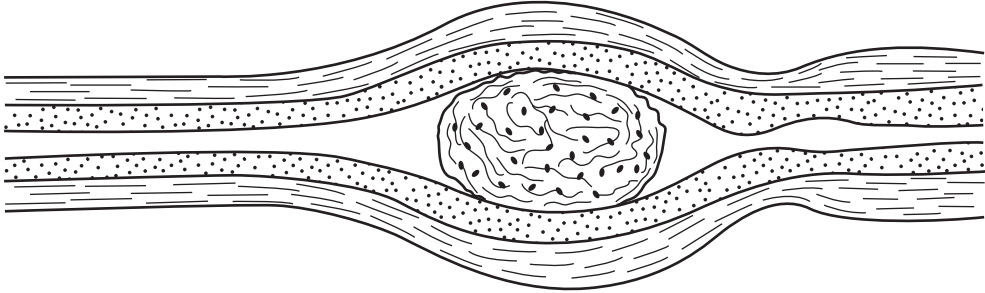


Fig. 6.1

(a) Label with the letter **K** the muscle that is contracting to push the food. [1]

Fig. 6.2 shows a diagram of an X-ray of part of the intestine.

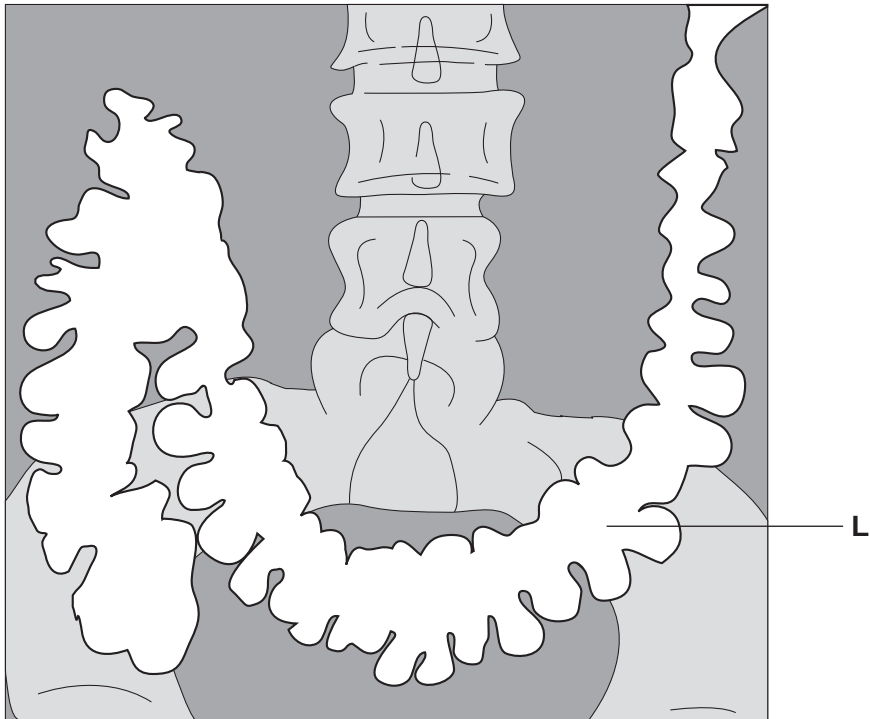


Fig. 6.2

(b) Identify region **L**, the lightest area, in Fig. 6.2.

..... [1]

- (c) Fig. 6.3 (a) shows the walls of region **L** highly magnified. Fig. 6.3 (b) shows the magnified walls of another part of the intestine, region **M**.

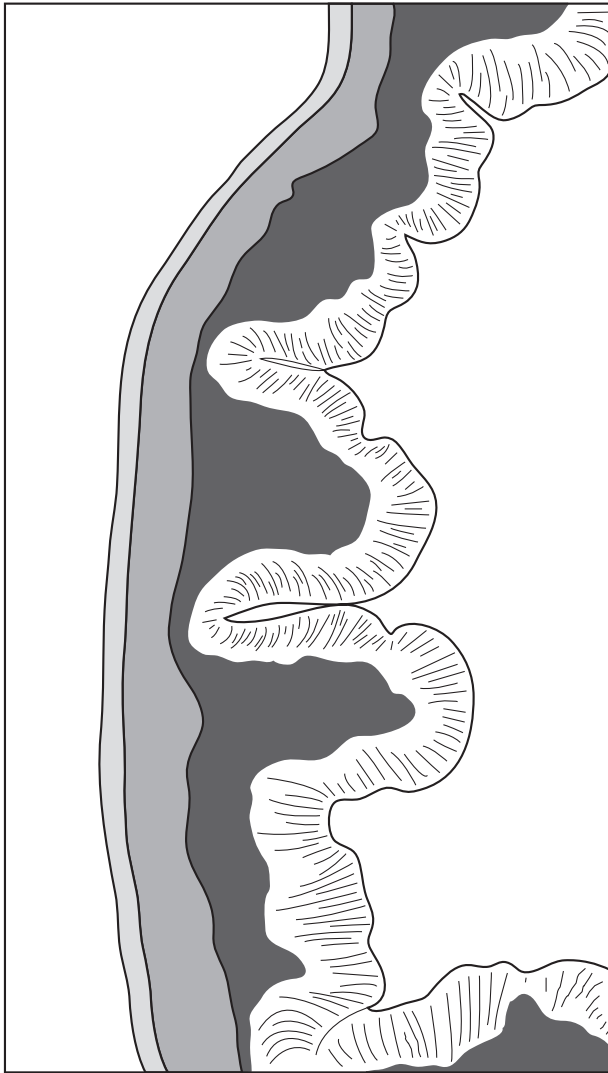


Fig. 6.3 (a)

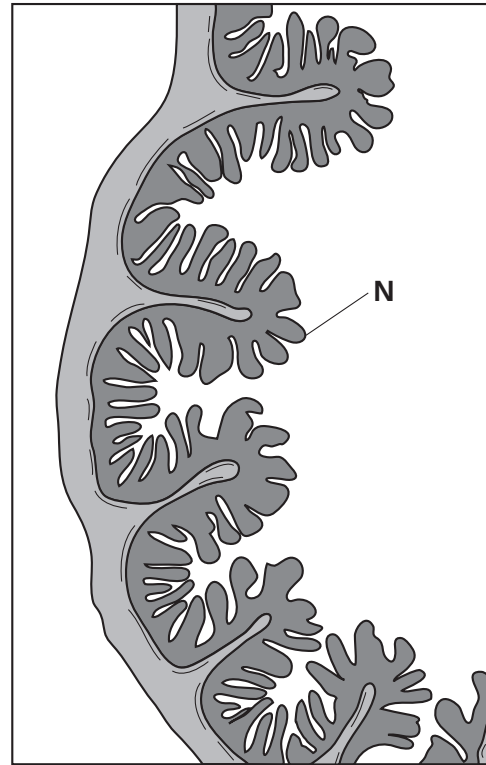


Fig. 6.3 (b)

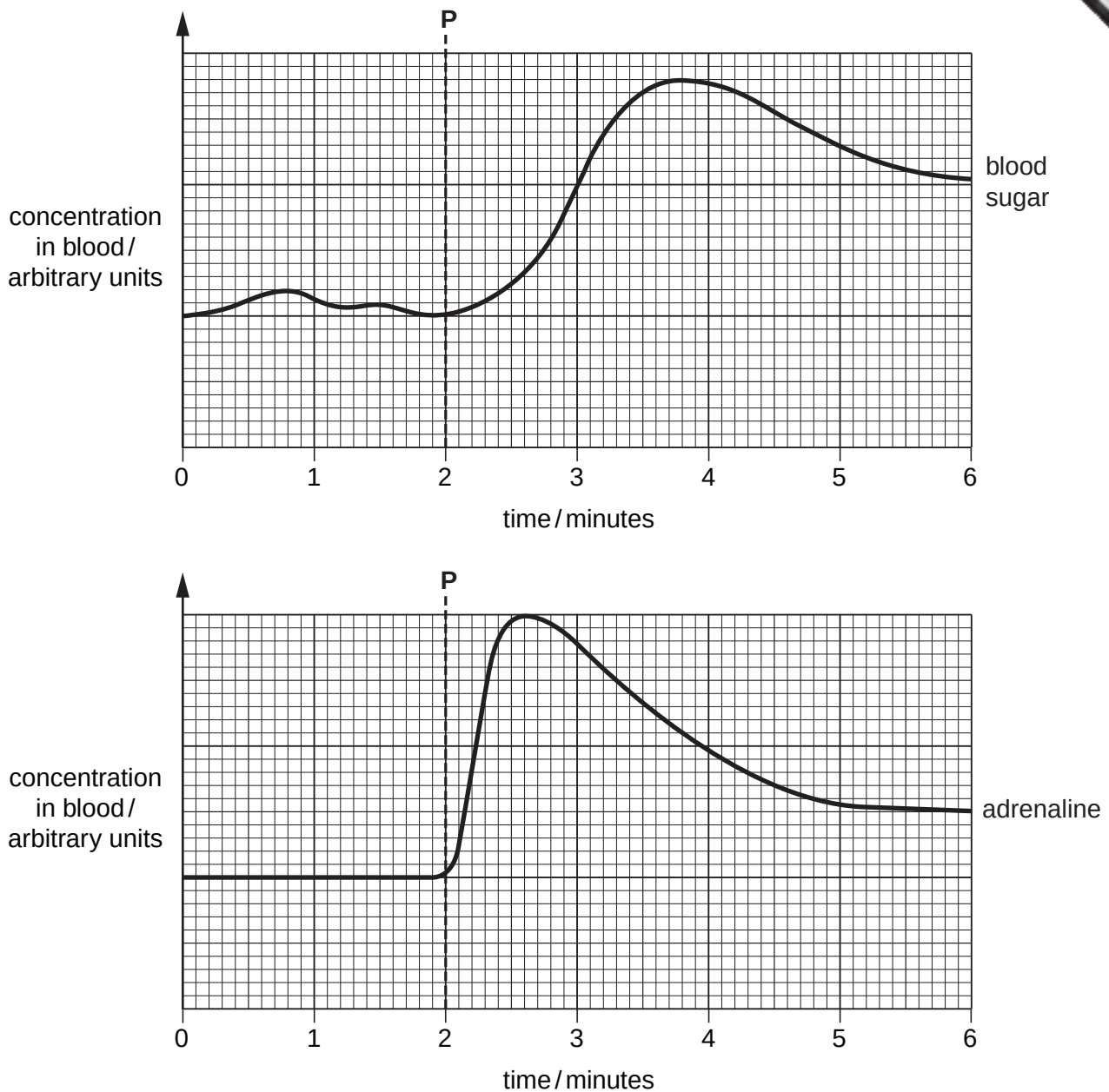
- (i) Identify structure **N** shown in Fig. 6.3 (b).

..... [1]

- (ii) Explain how the internal surfaces of regions **L** and **M** are adapted for their functions.

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

- 7 The concentrations of sugar and of adrenaline in a person's blood were measured at the same time over a period of six minutes. Fig. 7.1 shows these measurements.



**Fig. 7.1**

- (a) Name the sugar known as blood sugar.

..... [1]

- (b) Using both graphs explain why the concentration of blood sugar changed after time P.

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

- (c) Explain how the concentrations of blood sugar and adrenaline are returned to their original levels.

*blood sugar*

.....

.....

.....

*adrenaline*

.....

.....

..... [3]

[Total: 6]

Write your answers in the spaces provided.

- ..... [3]

- ..... [5]



- (ii)** Describe how different forms of water pollution can cause harm to humans.

[7]

[Total: 15]

- 9 (a)** State the similarities and the differences between plant and animal cells.

[5]

[5]

**(b)** Describe the importance to the cell of each structural feature you have stated in (a).

..... [10]

[10]

[Total: 15]

## 10 Either

**(a)** State the physical and social effects on a person of heroin abuse.

[5]

**(b) (i)** Describe the chief signs and symptoms of HIV/AIDS.

..... [5]

**(ii)** Explain how HIV/AIDS is spread.

[5]

[Total: 15]

**10 Or**

**(a)** State the chief signs and symptoms of tuberculosis.

..... [5]

[5]

**(b)** State the cause of tuberculosis and explain how the disease is spread and controlled.

..... [10]

[10]

[Total: 15]

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*Copyright Acknowledgements:*

Question © M108/0443 Coloured SEM of blood in sickle cell anaemia; Science Photo Library.

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