

Centre Number	Candidate Number	Name
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CAMBRIDGE INTERNATIONAL EXAMINATIONS  
General Certificate of Education Ordinary Level

**HUMAN AND SOCIAL BIOLOGY**

**5096/02**

Paper 2

October/November 2003

**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.

For Examiner's Use	
<b>Section A</b>	
<b>Section B</b>	/
<b>8</b>	
<b>9</b>	
<b>10</b>	
<b>TOTAL</b>	

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.

## Section A

Answer **all** the questions.

Write your answers in the spaces provided.

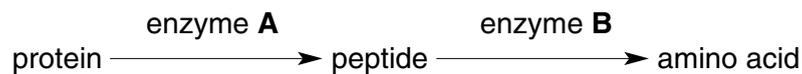
- 1 (a) Carbohydrates, fats and proteins all contain carbon, hydrogen and oxygen.  
Name an additional element that all proteins contain.

..... [1]

- (b) A sample of food is broken up into small pieces and dissolved in water to form a solution.  
Describe how you would test this solution for the presence of protein and state what you will observe.

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

- (c) Fig. 1.1 shows the stages in the digestion of a protein.



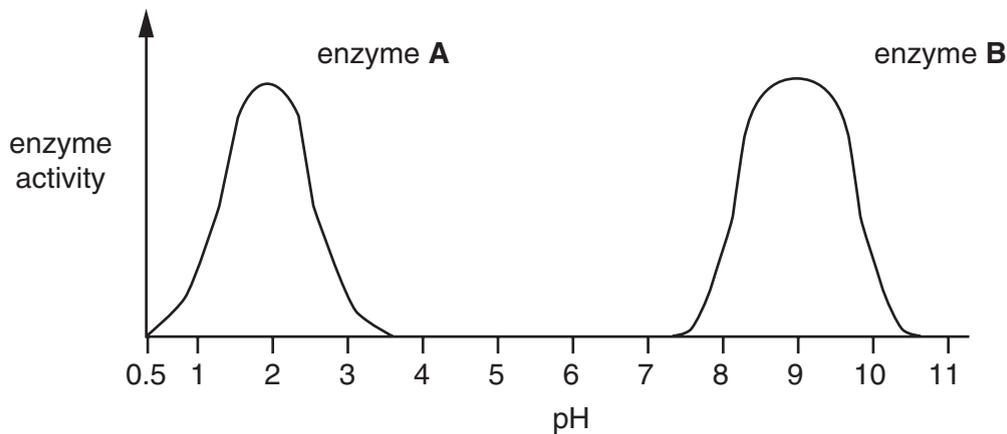
**Fig. 1.1**

Complete the table below by naming enzymes **A** and **B**.

	enzyme <b>A</b>	enzyme <b>B</b>
where active	stomach	duodenum
name of enzyme		

[2]

(d) Fig. 1.2 shows how the activity of these enzymes varies with pH.



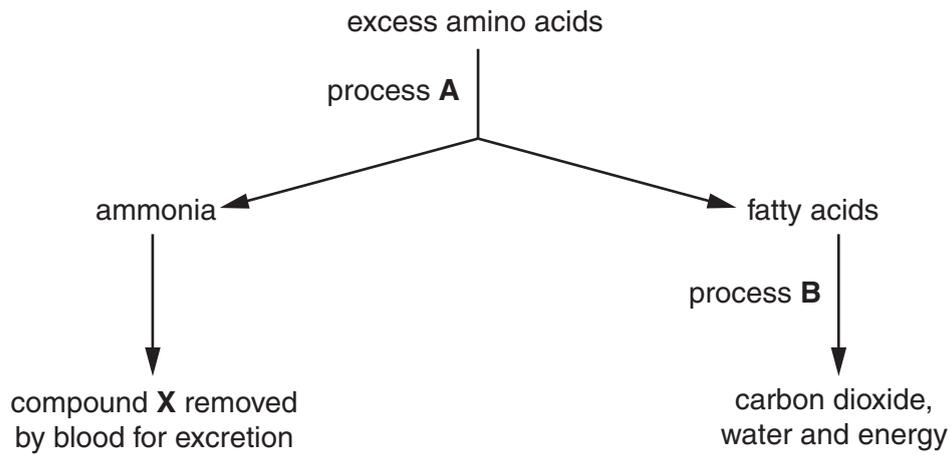
**Fig. 1.2**

- (i) Which of the enzymes, **A** or **B**, is active in alkaline conditions? .....[1]
- (ii) State its optimum pH. ....[1]
- (e) Amino acids are absorbed in the ileum. This part of the alimentary canal is lined by villi on which there are cells that secrete mucus. The walls of the ileum have layers of muscle.
- State the functions of these features.
- (i) villi .....[1]
- (ii) mucus .....[1]
- (iii) muscle layers .....[1]
- (f) Once absorbed into the body, many amino acids are used to make new proteins. Complete the table below by naming the proteins described.

description of protein	name of protein
used to carry oxygen	
a defensive type of protein made by lymphocytes	
a fibrous protein forming part of a clot	
a fibrous protein found in bones	
a protein hormone	

[5]

(g) Fig. 1.3 shows what happens to excess amino acids in the body.



**Fig. 1.3**

(i) Name

process **A**; .....

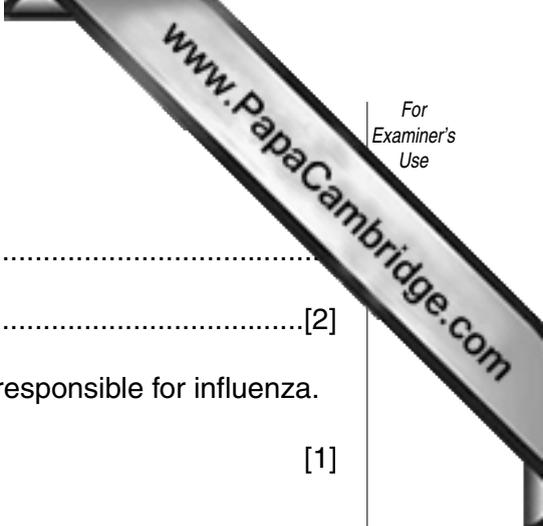
process **B**; .....

compound **X**. .....

[3]

(ii) Name the organ in which process **A** occurs. ....[1]

[Total : 20]



2 (a) State two **symptoms** of influenza.

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

(b) (i) Name the type of pathogen (causative organism) that is responsible for influenza.

..... [1]

(ii) Describe how it is transmitted.

.....[1]

(c) State **one** way by which its spread may be limited.

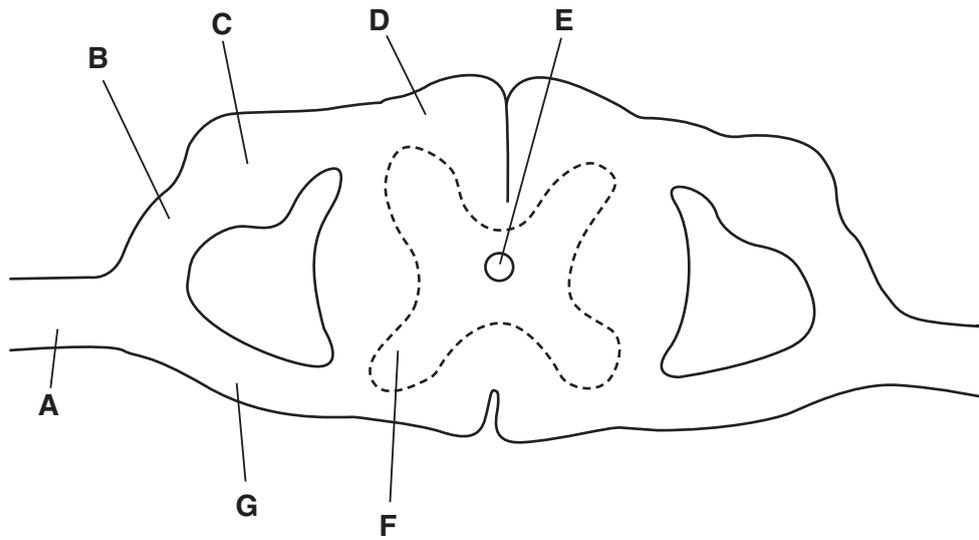
.....[1]

(d) Explain why, after catching influenza and recovering from it, a person can catch it again.

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

[Total : 6]

- 3 Fig. 3.1 shows a cross-section through the spinal cord.



**Fig. 3.1**

Complete the table below by using the letters **A** to **G** from Fig. 3.1 to identify the regions described.

structures found	region
sensory neurones only	
motor neurones only	
sensory and motor neurones	
sensory neurone cell bodies	
motor neurone cell bodies	

[Total : 5]

4 Fig. 4.1 shows changes in the concentration of two ovarian hormones in the blood of a woman during one menstrual cycle, together with the state of the uterine lining.

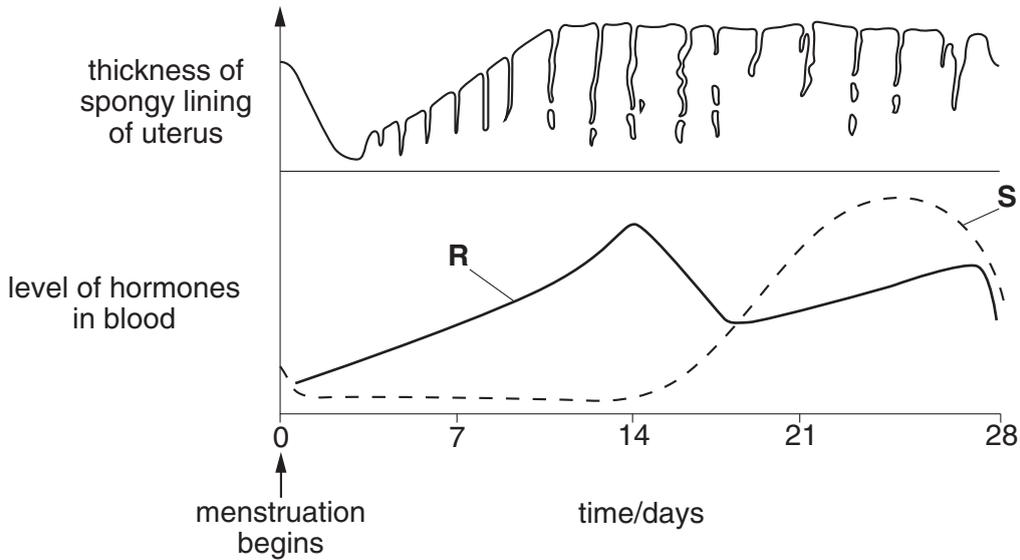


Fig. 4.1

(a) Identify hormones **R** and **S**.

**R** .....

**S** .....

[2]

(b) Name the structures in the ovary that produce these hormones.

hormone **R** .....

hormone **S** .....

[2]

(c) Describe the effect on the uterine lining of

(i) the increase in **R** (days 1 to 14); .....

.....[1]

(ii) the decrease in **S** (days 26 to 28). .....

.....[1]

(d) State what happens to the ovum on or around day 14 of the cycle.

.....[1]

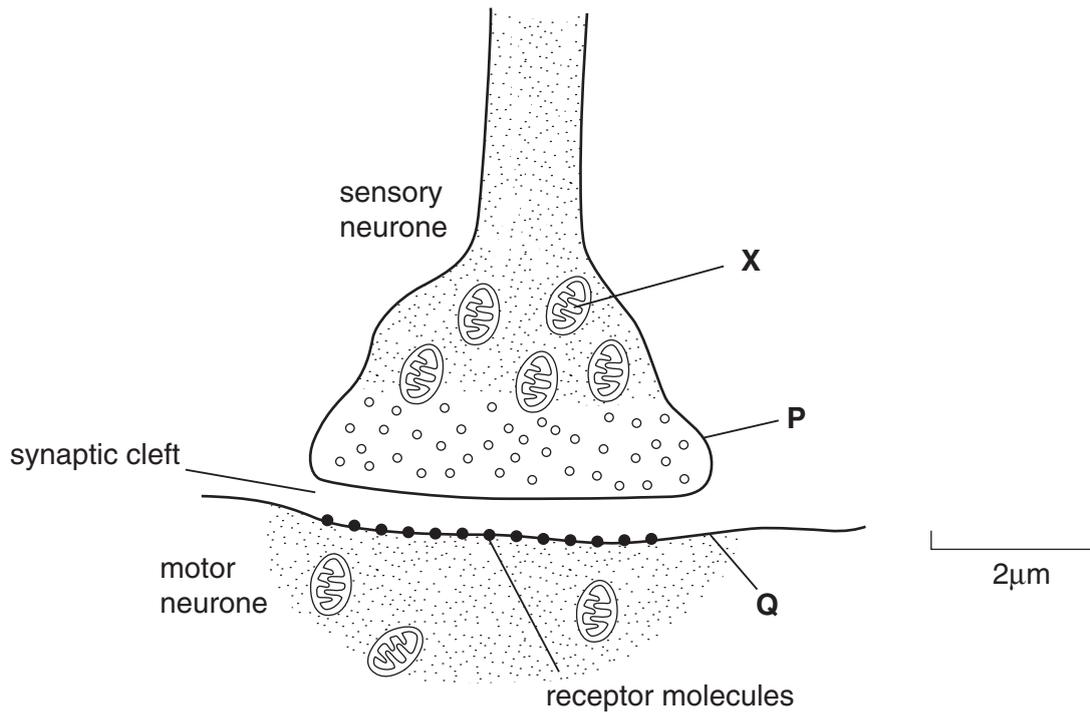
(e) In Fig. 4.1, the levels of hormones **R** and **S** fall steeply from day 26 to day 28.

What would cause the levels of these hormones to remain high?

.....[1]

[Total : 8]

- 5 Fig. 5.1 shows details of a synapse between a sensory and a motor neurone.



**Fig. 5.1**

Read the passage below and then answer the questions.

When a nerve impulse arrives at structure **P**, vesicles of a chemical transmitter substance fuse with the membrane of the sensory neurone discharging into the synaptic cleft. The molecules of the transmitter diffuse across the cleft to membrane **Q**, where they bind to the receptor molecules. Once the molecules of the transmitter are bound to the receptors, a new impulse is generated in the motor neurone.

(a) Suggest why such an arrangement

- (i) causes a delay in reflex actions;

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

- (ii) transmits only from **P** to **Q**, **not** from **Q** to **P**.

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

(b) An enzyme is present in the cleft to break down the transmitter substance and so remove it from the receptors.

If there was no such enzyme, what would happen to

(i) motor neurone **Q**;

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

(ii) the muscle supplied by neurone **Q**?

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

(c) The substances produced by the action of the enzyme in the cleft are absorbed by **P** and rebuilt into new molecules of the transmitter substance using energy from the structure labelled **X**.

Name the structure labelled **X** ..... [1]

[Total : 5]

- 6 Fig. 6.1 shows the red blood cell count in two athletes, **V** and **W**, one of whom trained at altitude.

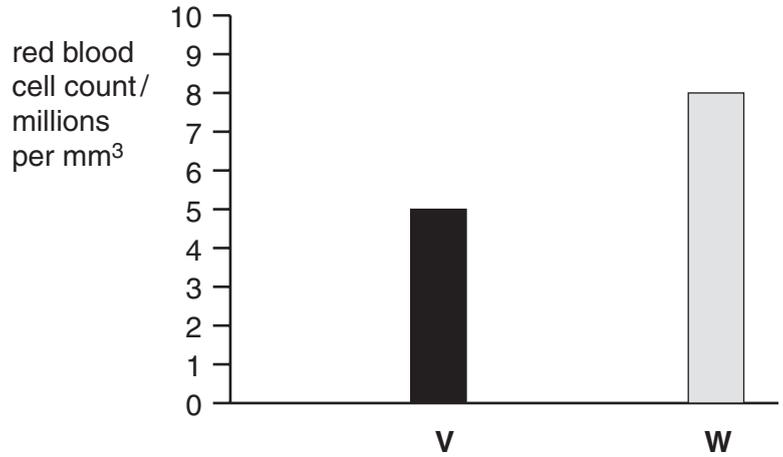


Fig. 6.1

- (a) Calculate the **percentage** by which the red blood cell count of **W** is higher than that of **V**. Show your working.

answer = ..... % [2]

- (b) Which of the two athletes is likely to have trained at high altitude? .....[1]

- (c) Explain why **V** is likely to recover more slowly from a long race than **W**.

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

- (d) State the mineral deficiency that may lead to a lower red blood cell count.

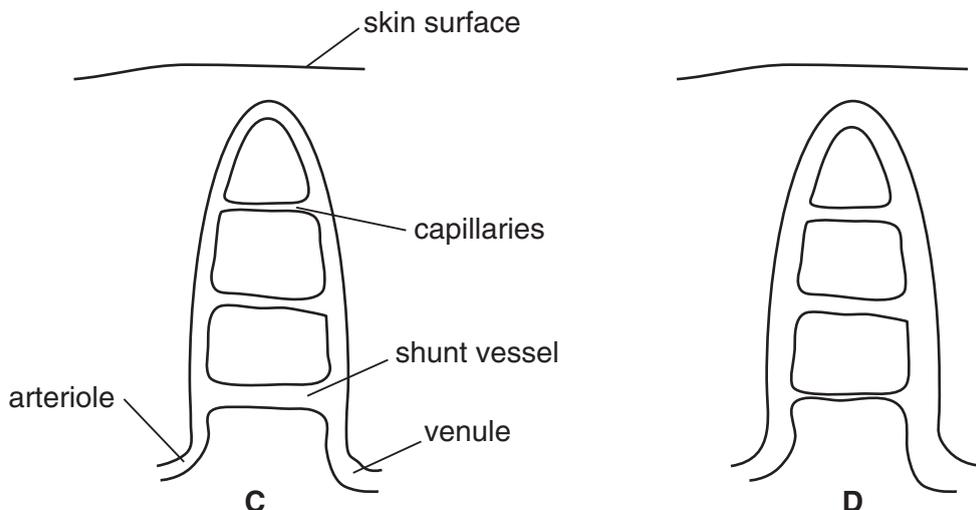
.....[1]

- (e) Some athletes artificially increase the numbers of their red blood cells. Suggest a possible danger to them of this practice.

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

[Total : 7]

7 Fig. 7.1 shows blood vessels in the skin during vasoconstriction, **C**, and vasodilation, thickness of the vessels indicates the volume of blood flowing in them.



**Fig. 7.1**

(a) With reference to Fig. 7.1, describe two ways in which the blood flow in **D** differs from that in **C**.

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

(b) Vasoconstriction in the skin is brought about by muscle contraction when body temperature falls below normal.

State two other effects brought about by muscle contraction in the skin in response to cold conditions.

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

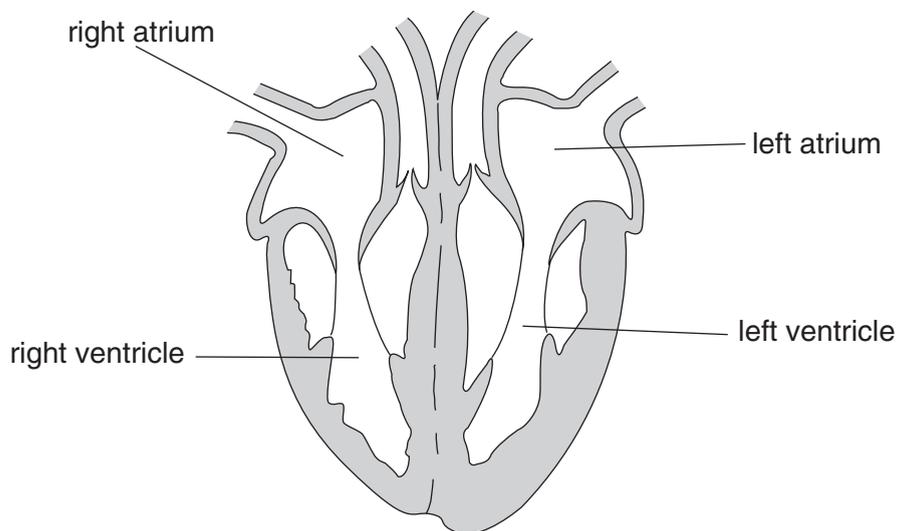
[Total : 4]

## 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 Fig. 8.1 shows a diagram of a section through the heart from the front.



**Fig. 8.1**

- (a) With reference to Fig. 8.1,
- (i) describe and explain the flow of **oxygenated** blood through the heart;
  - (ii) explain how the valves ensure one-way flow of this oxygenated blood. [8]
- (b) The first arteries to branch from the aorta pass into the heart muscle.
- (i) Name these arteries. [1]
  - (ii) If these arteries become narrowed by deposits of fat, how and why will the supply of blood to the rest of the body be affected? [3]
  - (iii) Suggest **three** ways in which this narrowing can be prevented by changes in lifestyle. [3]

[Total : 15]

- 9 Fig. 9.1 shows the life cycle of the anopheline mosquito, the insect responsible for malaria.

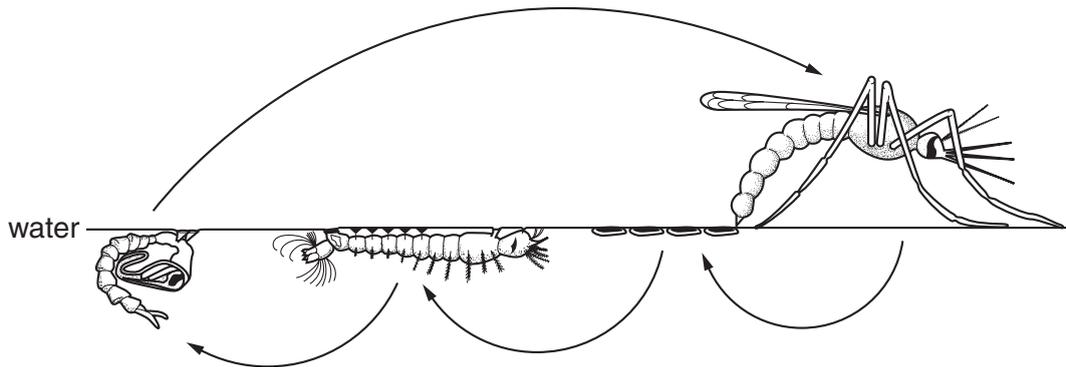


Fig. 9.1

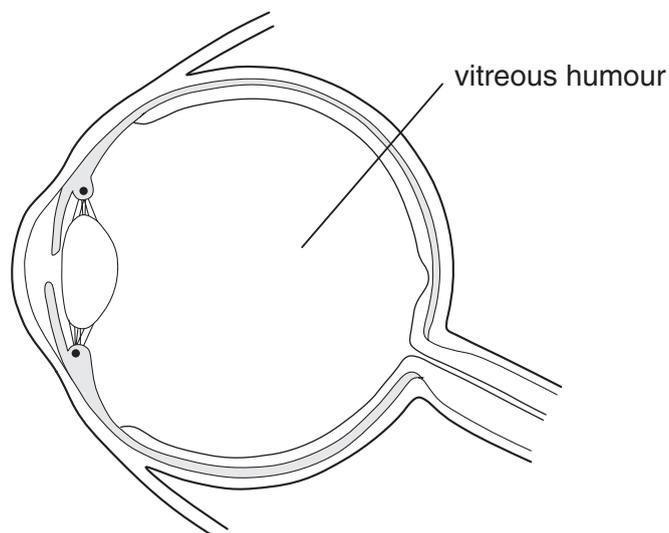
- (a) List **three structural** features that show that the adult mosquito is an insect. [3]
- (b) Explain why not all mosquitoes carry malaria. [3]
- (c) Describe **one** method that can be used to attack each stage of the mosquito's life cycle. Use a different method for each stage. [4]
- (d) One sign of malaria is a fever occurring every two or three days. What causes this? [3]
- (e) Although there are many ways of attacking the mosquito and there are also drugs to treat the malarial parasite in humans, malaria is on the increase. Give **two** reasons for this increase. [2]

[Total : 15]

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

### 10 Either

Fig. 10.1 is a diagram of a section through the eye.



**Fig. 10.1**

- (a) With reference to Fig. 10.1,
- (i) describe how the different parts of the eye help us to focus on a near object; [6]
  - (ii) describe how the vitreous humour helps us to see distant objects. [3]
- (b) The inheritance of the colour of the iris of the eye is caused by a pair of alleles, where brown eye colour (**B**) is dominant over blue eye colour (**b**).
- Show, using labelled diagrams, why
- (i) two blue-eyed parents normally have blue-eyed children;
  - (ii) two brown-eyed parents may have a blue-eyed child.

[6]

[Total : 15]

Or

(a) Describe the actions of

- (i) antiseptics,
- (ii) antibiotics,
- (iii) antibodies,
- (iv) antitoxins

in treating a patient who has a wound that may be infected with tetanus.

[10]

(b) Discuss the advantages and disadvantages of using an immune serum to treat a disease such as tetanus, compared with using a vaccine.

[5]

[Total : 15]

