



**HUMAN AND SOCIAL BIOLOGY**

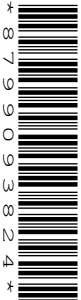
Paper 2

**5096/02**

**May/June 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.

**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	
3	
4	
5	
6	
7	
<b>Section A sub-total</b>	
8	
9	
10	
<b>Total</b>	

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

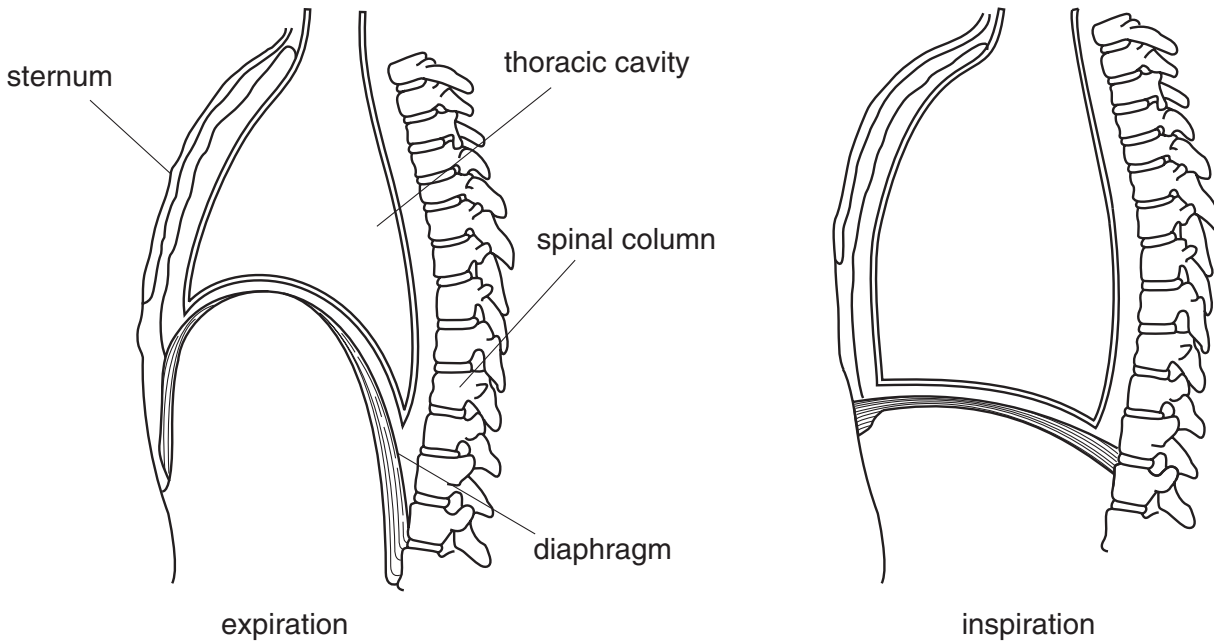


**Section A**

Answer **all** the questions.

Write your answers in the spaces provided.

1 Fig. 1.1 shows the thorax from the side during expiration and inspiration.



**Fig. 1.1**

(a) Using Fig. 1.1, state the changes that occur to the sternum and the diaphragm during inspiration.

sternum.....

diaphragm..... [2]

(b) State the effect of the changes you described in (a) on the volume and pressure of the thoracic cavity.

volume .....

pressure..... [2]

(c) Most of the tubes leading from the nose to the lungs are lined by mucus-secreting cells and ciliated cells. Describe the functions of

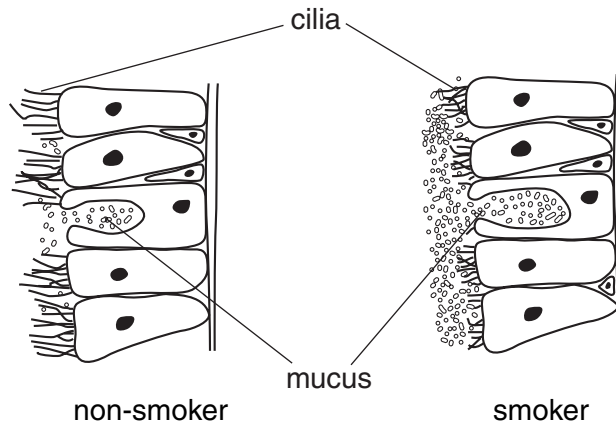
(i) the mucus, .....

.....

(ii) the cilia. ....

..... [4]

(d) Fig. 1.2 shows some of these cells from the lining of the bronchus in a non-smoker and a smoker.



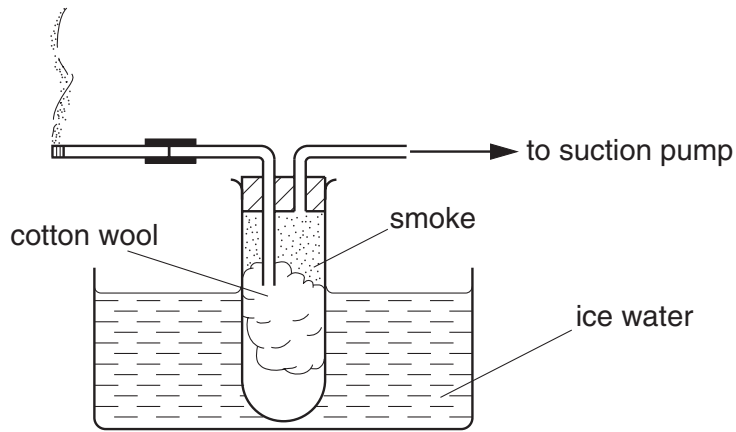
**Fig. 1.2**

Using Fig. 1.2, state two ways in which the lining of the bronchus of the smoker differs from that of the non-smoker.

1. ....

2. .... [2]

(e) Fig. 1.3 shows a simple apparatus to collect the products of cigarette smoke.



**Fig. 1.3**

Name the substance in the smoke which

- (i) stains the cotton wool brown, .....
- (ii) is highly addictive, .....
- (iii) poisons haemoglobin. .... [3]

(f) The body's control of breathing begins in the brain. Receptors in the brain monitor the concentration of carbon dioxide in the blood. When this reaches a set point, inspiration begins.

- (i) Explain why muscular exercise will make us breathe faster.  
.....  
..... [2]

(ii) The control of breathing described in (f) is a reflex.

Explain why it is an advantage to have breathing controlled by a reflex.

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

- (g) Breathing can be regulated to some extent. For example, people regulate their breathing during activities such as diving, playing a wind instrument, singing and blowing up a balloon.

If one takes a deep breath, it is possible to hold that breath for about 45 seconds. However, if one breathes in and out deeply several times and then inhales fully, it is possible to hold that breath for much longer.

Explain why this is so.

.....

.....

.....[3]

[Total: 20]

2 Fig. 2.1 shows the mechanisms by which the body controls the water content of the blood.



Fig. 2.1

(a) Name **X** and **Y** and the hormone released from **Y**.

**X** = .....

**Y** = .....

hormone = ..... [3]

(b) Predict the probable effects on the **volume** of urine produced if a person

(i) sweats heavily, .....

(ii) drinks a litre of water, .....

(iii) has excessive diarrhoea. .... [3]

[Total: 6]

**3** Before birth, the baby's temperature is maintained by the amniotic fluid. If babies are born prematurely, they are small, have thin skin with prominent blood vessels, little fat under the skin and a poorly developed shivering response. In cold climates, it is necessary to keep the premature baby warm in an incubator.

**(a)** Explain how each of the following makes it necessary to keep the baby warm in an incubator.

**(i)** smaller size .....  
.....  
..... [2]

**(ii)** thin skin .....  
.....  
..... [2]

**(iii)** little fat under the skin .....  
..... [1]

**(iv)** poorly developed shivering response .....  
..... [1]

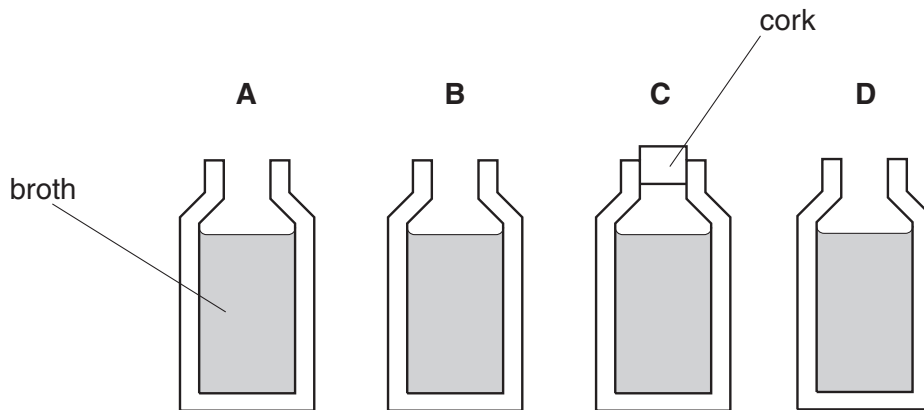
**(b)** In addition, the baby may be wrapped in aluminium foil and the air-flow through the incubator may be moistened. Suggest how each of these will help to keep the baby warm.

**(i)** aluminium foil .....  
.....

**(ii)** moistening the air-flow .....  
..... [2]

[Total: 8]

- 4 Four bottles of a clear broth were boiled, cooled and then treated as shown in Fig. 4.1.



storage temperature / °C	30	5	30	30
disinfectant added to broth	no	no	no	yes

**Fig. 4.1**

After 24 hours the results were as shown in Table 4.1 below.

**Table 4.1**

bottle	appearance
<b>A</b>	cloudy
<b>B</b>	a little cloudy
<b>C</b>	clear
<b>D</b>	clear

Using the results in Table 4.1, explain the differences between the following bottles.

- (i) **A and C**

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

- (ii) **A and D**

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

[Total: 4]



5 Fig. 5.1 shows the life cycle of the mosquito.

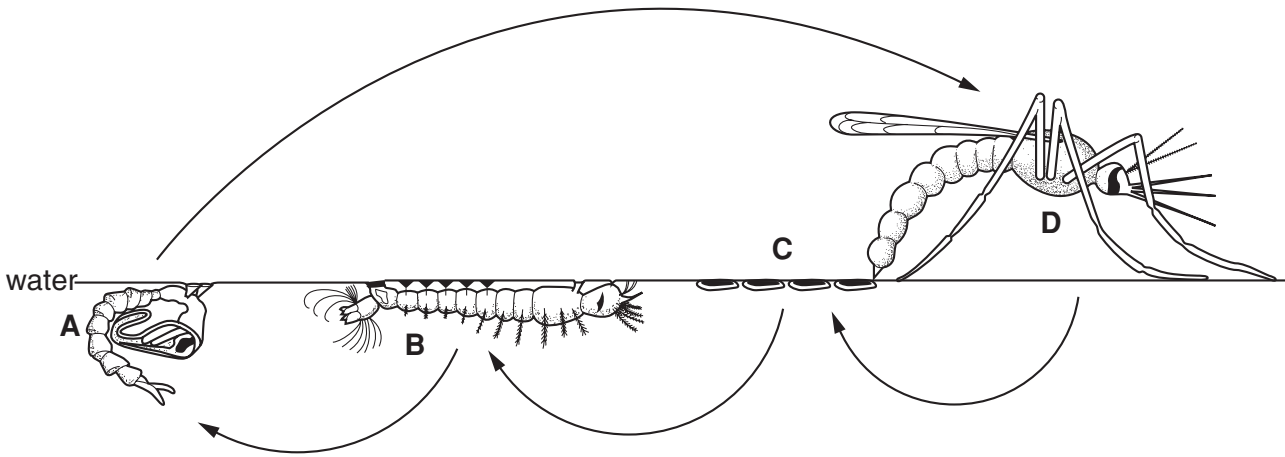


Fig. 5.1

(a) Name **A** and **B** in Fig. 5.1.

**A** = .....

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

(b) State two chemical methods of controlling **both A and B**.

1. ....

2. .... [2]

(c) (i) Name a biological method to control **both A and B**.

.....

(ii) Name a different biological method that controls **B only**.

.....

..... [2]

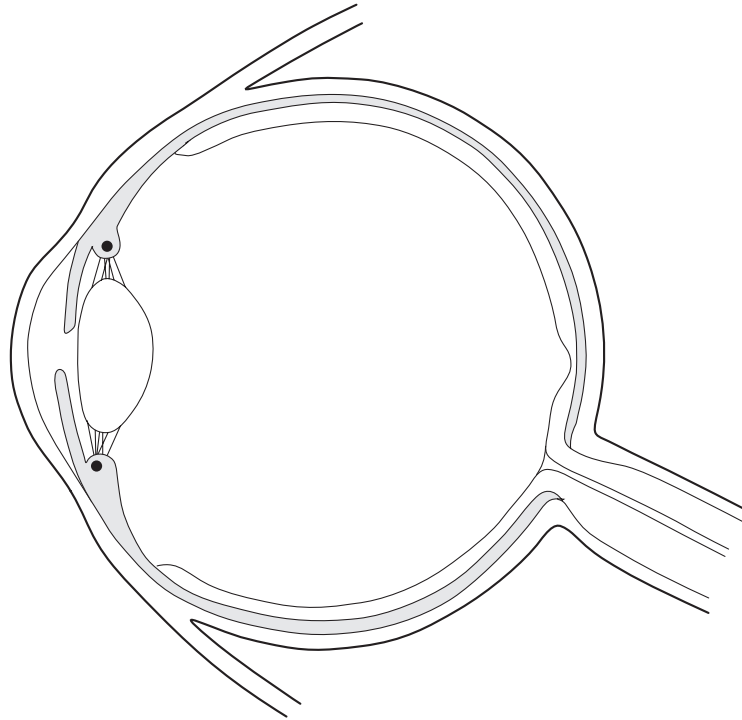
(d) State two advantages of biological methods over chemical methods of control.

1. ....

2. .... [2]

[Total: 8]

- 6 Fig. 6.1 shows a horizontal section through the eye.



**Fig. 6.1**

Using label-lines and the letters **J**, **K**, **L**, **M** and **N** on Fig. 6.1, show the position of each of the following

- J** a part of the retina containing only cones,
- K** a part of the retina which best responds to low light intensities,
- L** a part of the retina with no light-sensitive cells,
- M** a muscular region which contracts to focus on near objects,
- N** a muscular region which contracts in bright light.

[5]

[Total: 5]

7 Use the key below to identify organisms **P**, **Q**, **R** and **S**.  
Select your answers from the list provided:

Bacteria, Fungi, insects, Protozoa, viruses.

- |   |   |         |                                |
|---|---|---------|--------------------------------|
| 1 | (a) non-cellular, reproducing only in living cells<br>(b) cellular                    | go to 2 | = <b>P</b>                     |
| 2 | (a) composed of hyphae<br>(b) not composed of hyphae                                  | go to 3 | = <b>Q</b>                     |
| 3 | (a) cells with no nucleus<br>(b) cells with a nucleus                                 | go to 4 | = <b>R</b>                     |
| 4 | (a) single-celled, reproducing by fission<br>(b) multi-cellular, reproducing sexually |         | = <b>S</b><br>= <b>insects</b> |

**P** = .....

**Q** = .....

**R** = .....

**S** = .....

[4]

[Total: 4]

**Section B**

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

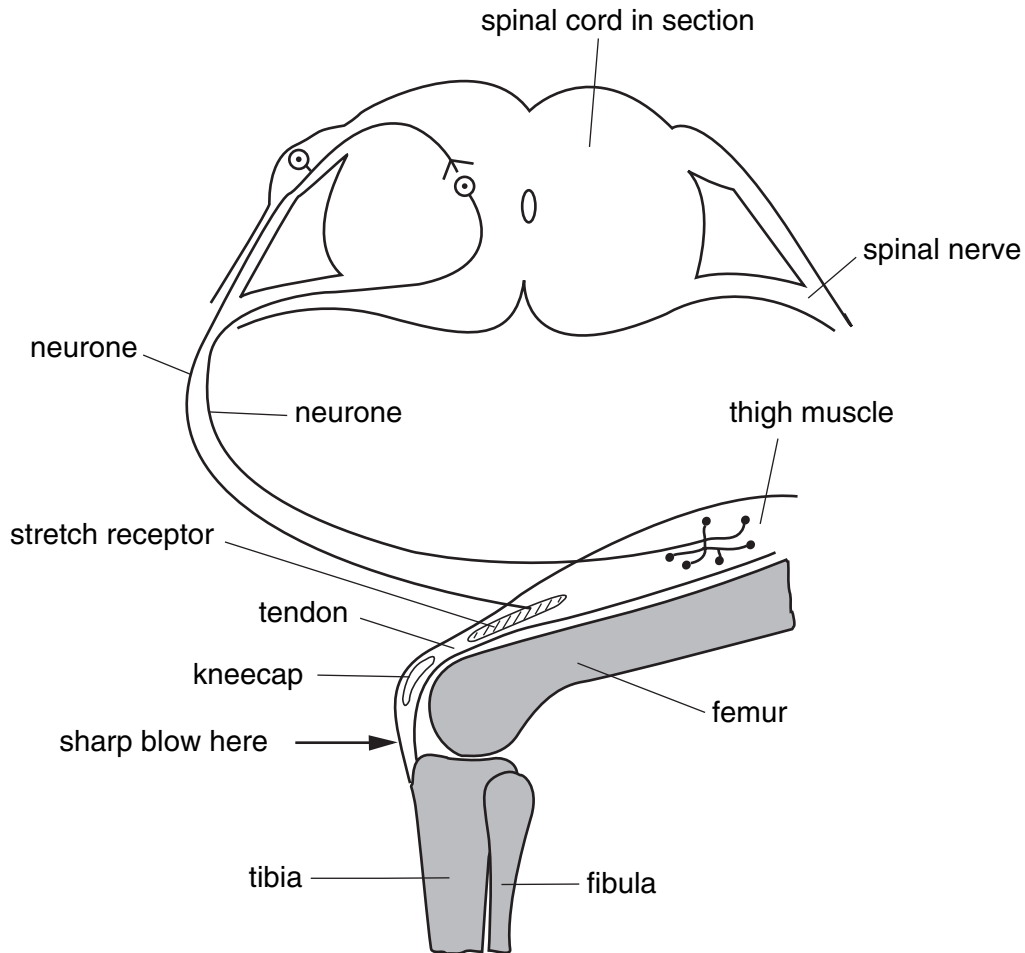
Write your answers on the separate answer paper provided.

- 8 (a) Distinguish between the terms *signs* and *symptoms* of a disease, giving an example of each for **cholera**. [4]
- (b) What is the causative organism of cholera? [1]
- (c) Explain why after a natural disaster, such as an earthquake or flood, an outbreak of cholera may occur. [4]
- (d) Vaccines are available for many diseases.
- Explain
- (i) what is meant by the term *vaccine*,
- (ii) how vaccines provide protection against infectious diseases. [6]
- 9 (a) Define the term *enzyme* and describe the main features that all enzymes have in common. [7]
- (b) Given a solution of starch and a solution of saliva, describe how you would show that it is an **enzyme** in the saliva that converts the starch to sugar. [8]

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 shows the structures involved in the knee-jerk reflex.

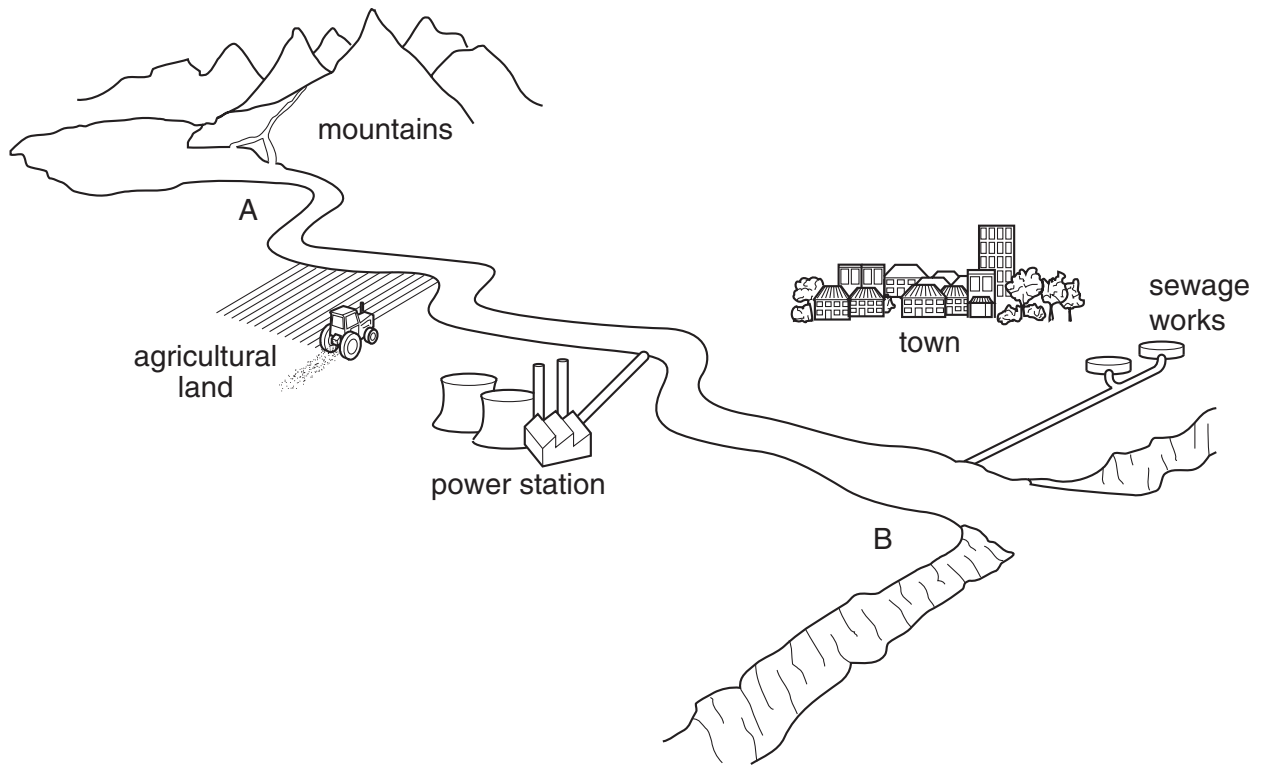


**Fig. 10.1**

- (a) Using Fig. 10.1 to help you, describe the steps by which a blow on the tendon is converted to a movement of the lower leg. [8]
- (b) Both bone and muscle are **tissues**. State how the structure of bone differs from the structure of muscle. [5]
- (c) Write an equation for the process that supplies the muscle cells with energy. [2]

10 Or

Fig. 10.2 shows a river flowing from A to B past agricultural land, a power station and a town.



**Fig. 10.2**

- (a) State **four** pollutants that may enter the river as it flows from **A** to **B**, and for each pollutant you name describe its **effect** on the river. [8]
- (b) River water contains bacteria. Explain how **filtration** and **chlorination** make river water safe to drink. [5]
- (c) Write an equation for the biological process that **increases** oxygen concentration in a river. [2]



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