

**ADVANCED GCE****BIOLOGY**

Mammalian Physiology and Behaviour

2805/05

Candidates answer on the Question Paper

OCR Supplied Materials:

None

Other Materials Required:

- Electronic calculator
- Ruler (cm/mm)

Friday 25 June 2010**Afternoon****Duration:** 1 hour 30 minutesCandidate
ForenameCandidate
Surname

Centre Number

Candidate Number

INSTRUCTIONS TO CANDIDATES

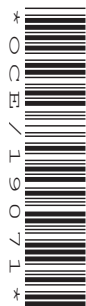
- Write your name clearly in capital letters, your Centre Number and Candidate Number in the boxes above.
- Use black ink. Pencil may be used for graphs and diagrams only.
- Read each question carefully and make sure that you know what you have to do before starting your answer.
- Answer **all** the questions.
- Do **not** write in the bar codes.
- Write your answer to each question in the space provided, however additional paper may be used if necessary.

INFORMATION FOR CANDIDATES

- The number of marks is given in brackets [] at the end of each question or part question.
- The total number of marks for this paper is **90**.
- You will be awarded marks for the quality of written communication where this is indicated in the question.
- You may use an electronic calculator.
- You are advised to show all the steps in any calculations.
- This document consists of **24** pages. Any blank pages are indicated.

Examiner's Use Only:

1			
2			
3			
4			
5			
6			
Total			



Answer **all** the questions.

- 1 Fig. 1.1 shows a section through the stomach wall.

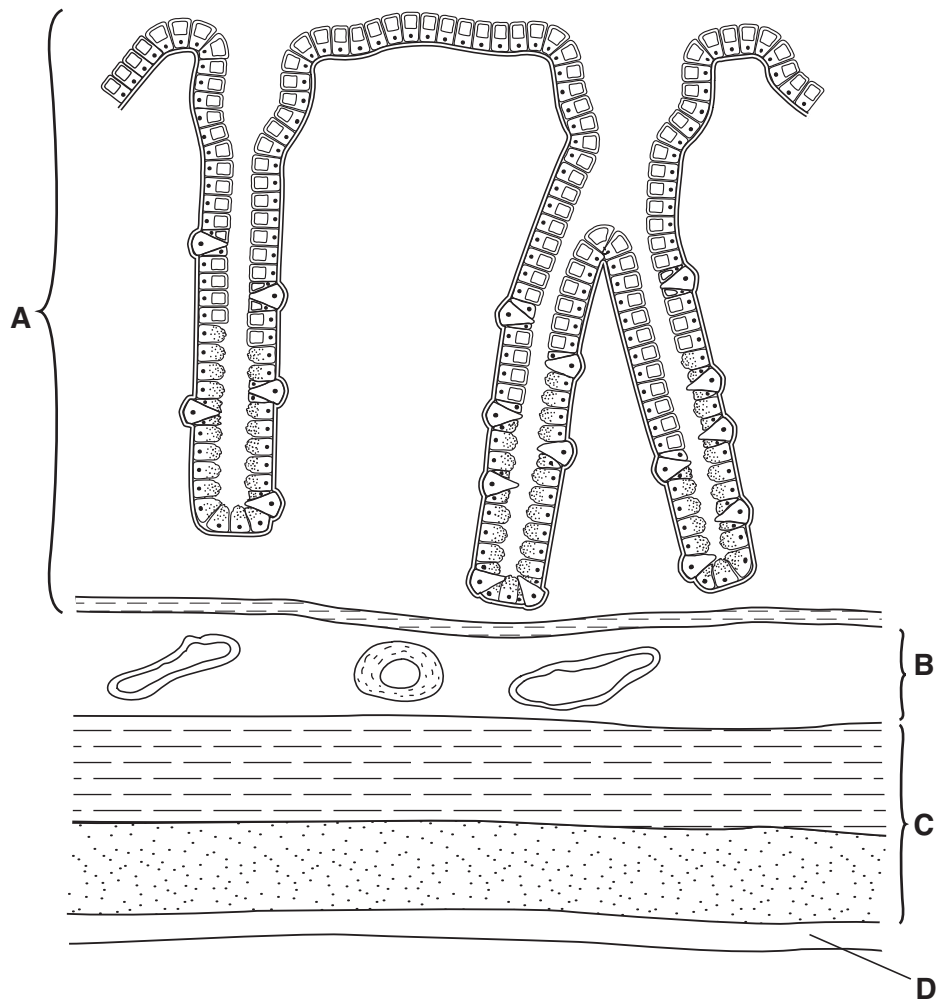


Fig. 1.1

- (a) Name the layers **A** to **D**.

A

B

C

D [4]

- (b) Cells in the lining of the stomach secrete pepsinogen, an inactive form of the enzyme pepsin. Pepsinogen is a longer molecule than pepsin.

Suggest why cells in the stomach secrete pepsinogen rather than pepsin.

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..... [2]

QUESTION 1(c) STARTS ON PAGE 4

(c) Fig. 1.2 is a diagram that shows some of the processes involved in the chemical digestion of protein and the absorption of amino acids.

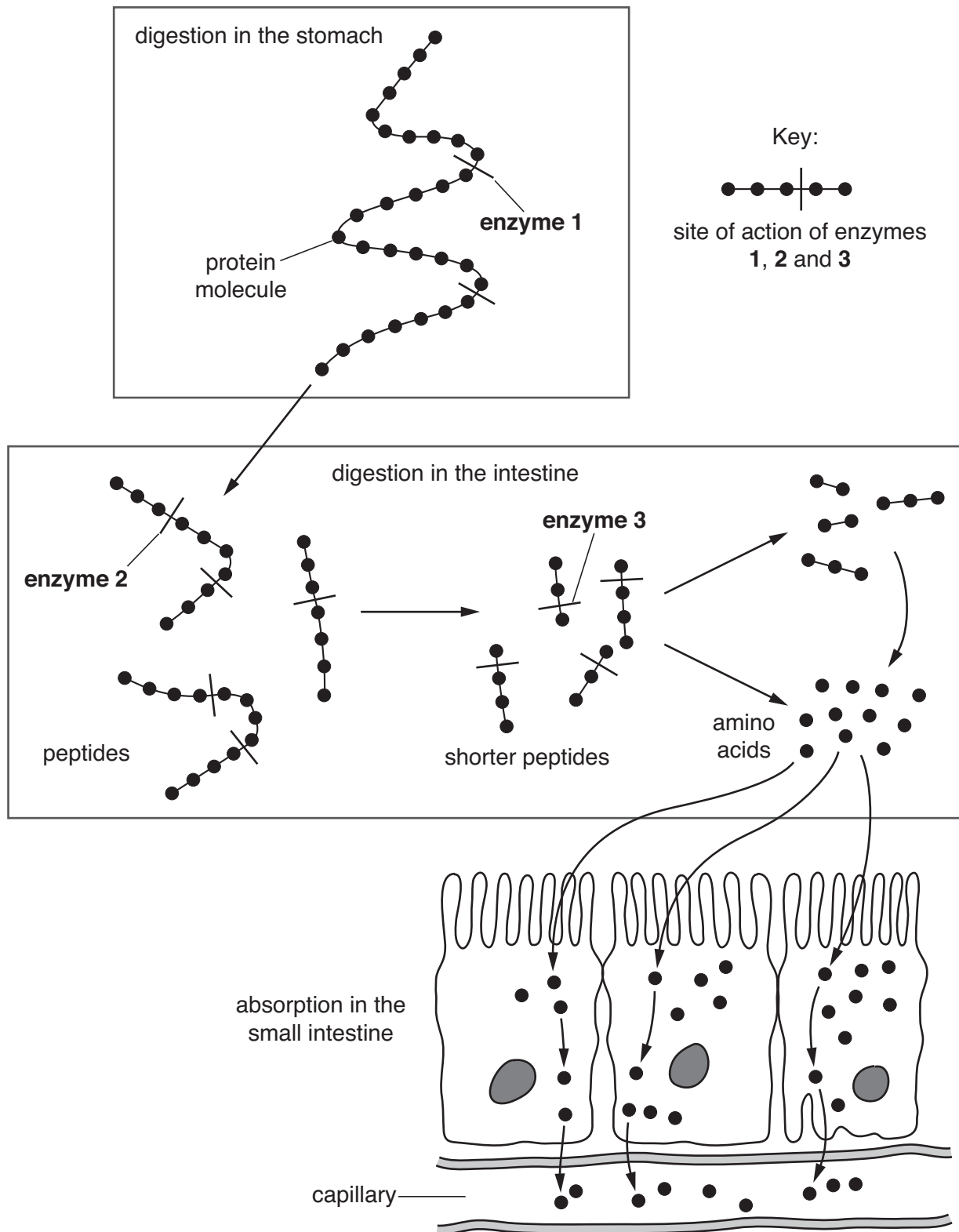


Fig. 1.2

(i) Name the enzymes **1**, **2** and **3** shown in Fig. 1.2.

1

2

3 [3]

(ii) Describe the action of **enzyme 3**.

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..... [3]

(iii) Explain how amino acids pass from the lumen of the small intestine to the capillary, as shown in Fig. 1.2.

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..... [4]

[Total : 16]

- 2 The mammalian liver is made up of lobules that consist of liver cells (hepatocytes) arranged in plates.

Fig. 2.1 shows a section of a liver lobule and its associated blood vessels.

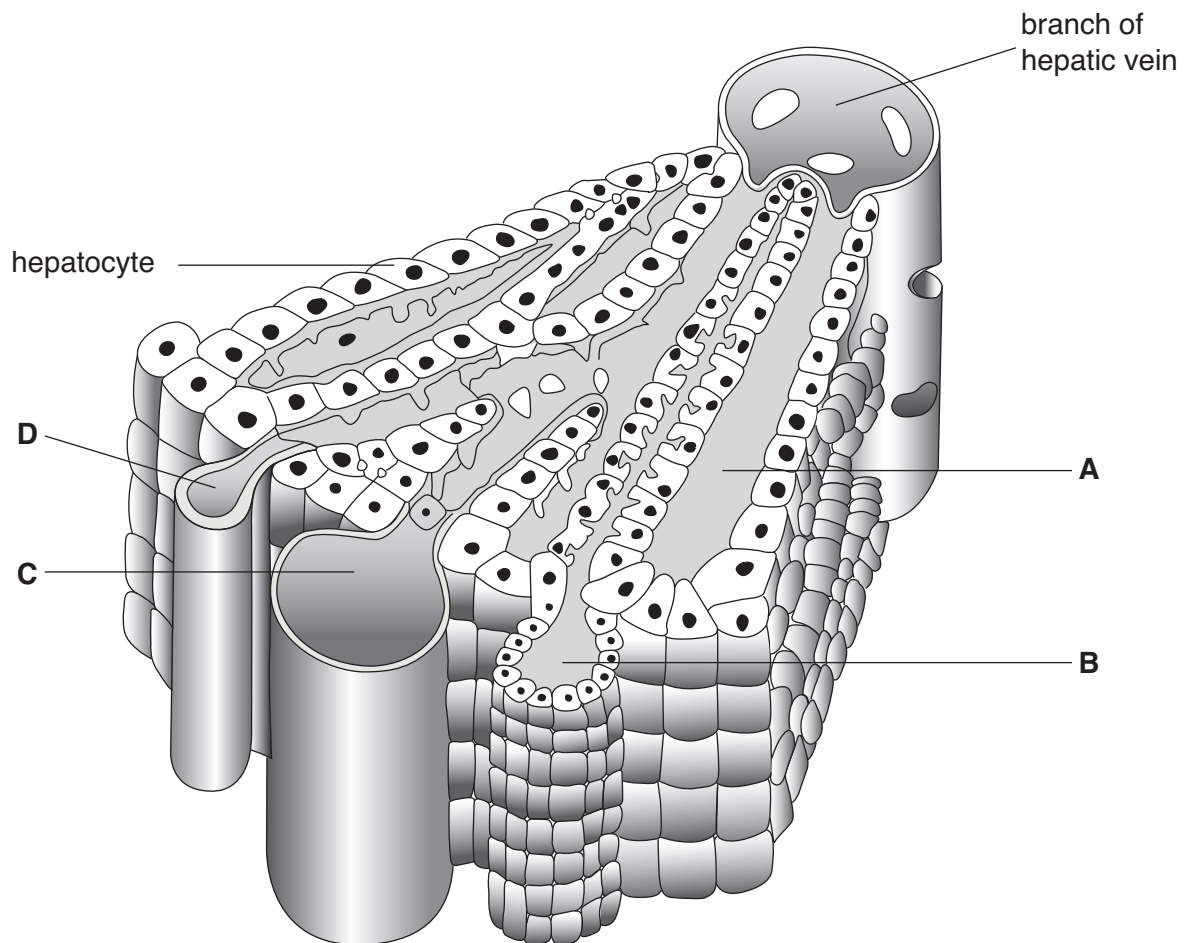


Fig. 2.1

(a) Name structures **A** to **D**.

A.....

B.....

C.....

D.....

[4]

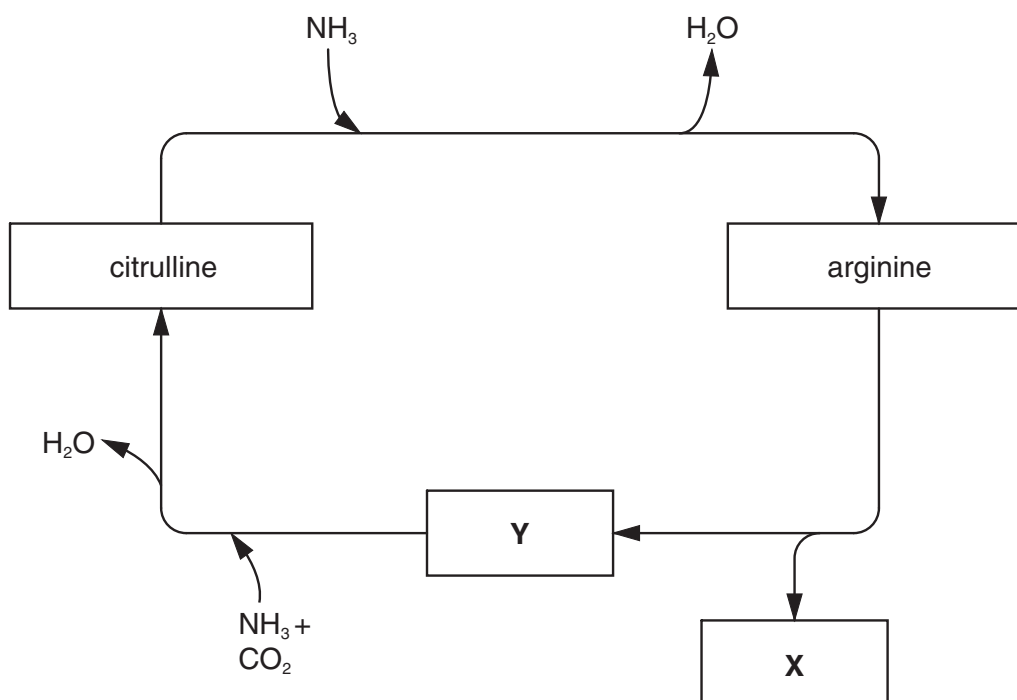


Fig. 2.2

With reference to Fig. 2.2;

- (i) name **X** and **Y**,

X.....

Y.....

[2]

- (ii) outline the role of this process in the mammal,

..... [2]

[2]

- (iii) state the name given to this process.

..... [1]

..... [7]

[Total : 17]

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QUESTION 3 STARTS ON PAGE 10

- 3 In an investigation, striated muscle tissue from a mammal was electrically stimulated over a period of 700 milliseconds (ms). The tension generated by the muscle was measured during the investigation and the results are shown in Fig. 3.1.

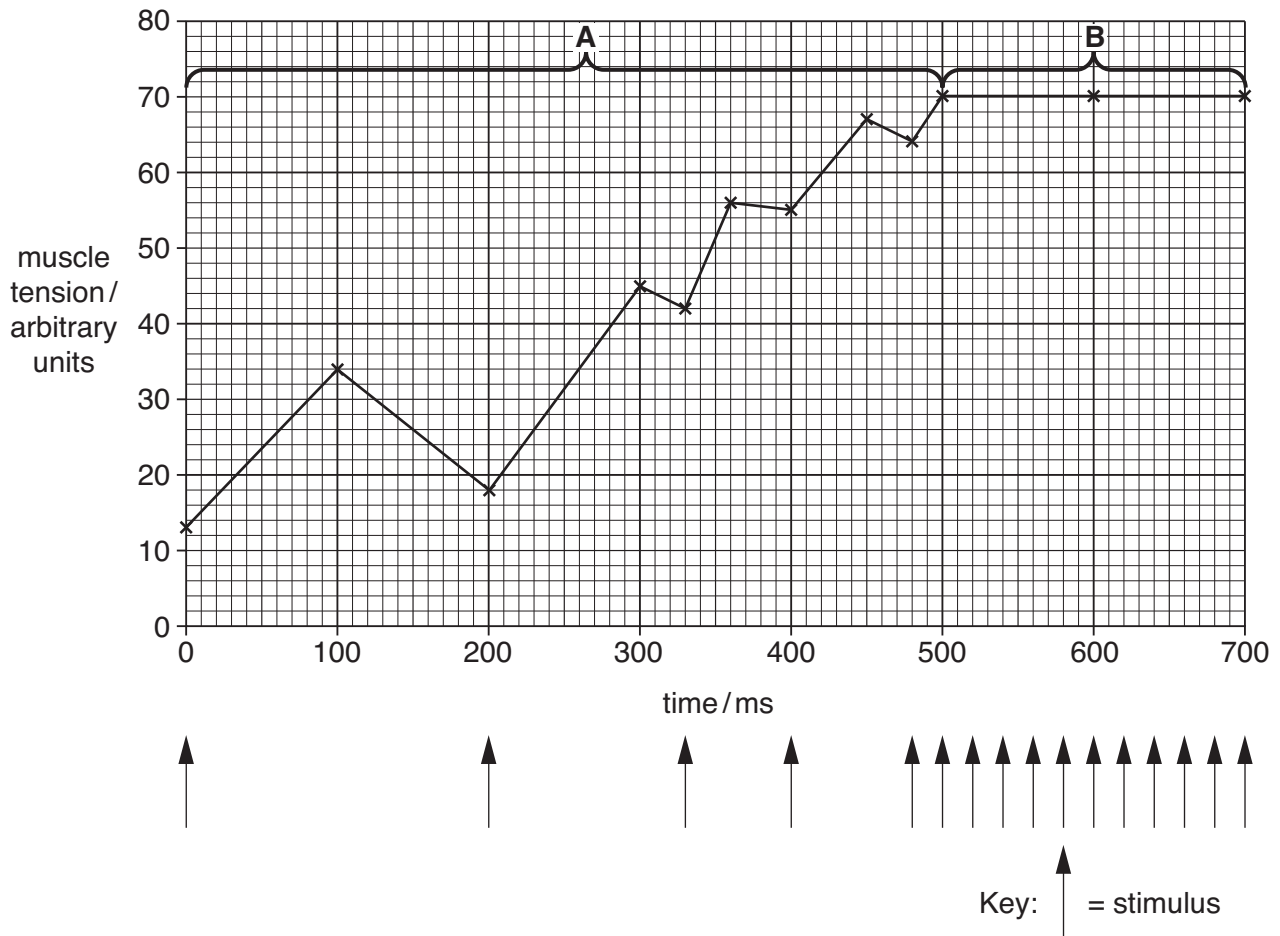


Fig. 3.1

- (a) (i) Describe the relationship between muscle stimulation and muscle tension in region **A** on Fig. 3.1.

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..... [2]

- (ii) Region **B** on Fig. 3.1 shows the tension of the muscle with repeated stimulation. Some toxins, such as those released by the tetanus bacterium, also cause the effect shown in region **B**.

Suggest why these toxins may be fatal.

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..... [3]

- (b) (i) State **two** ions that are essential for the formation of inorganic bone tissue.

..... [1]

- (ii) Name the material that comprises most of the organic matrix of bone.

..... [1]

QUESTION 3(c) STARTS ON PAGE 12

Fig. 3.2 shows a section of compact bone as seen using a light microscope.

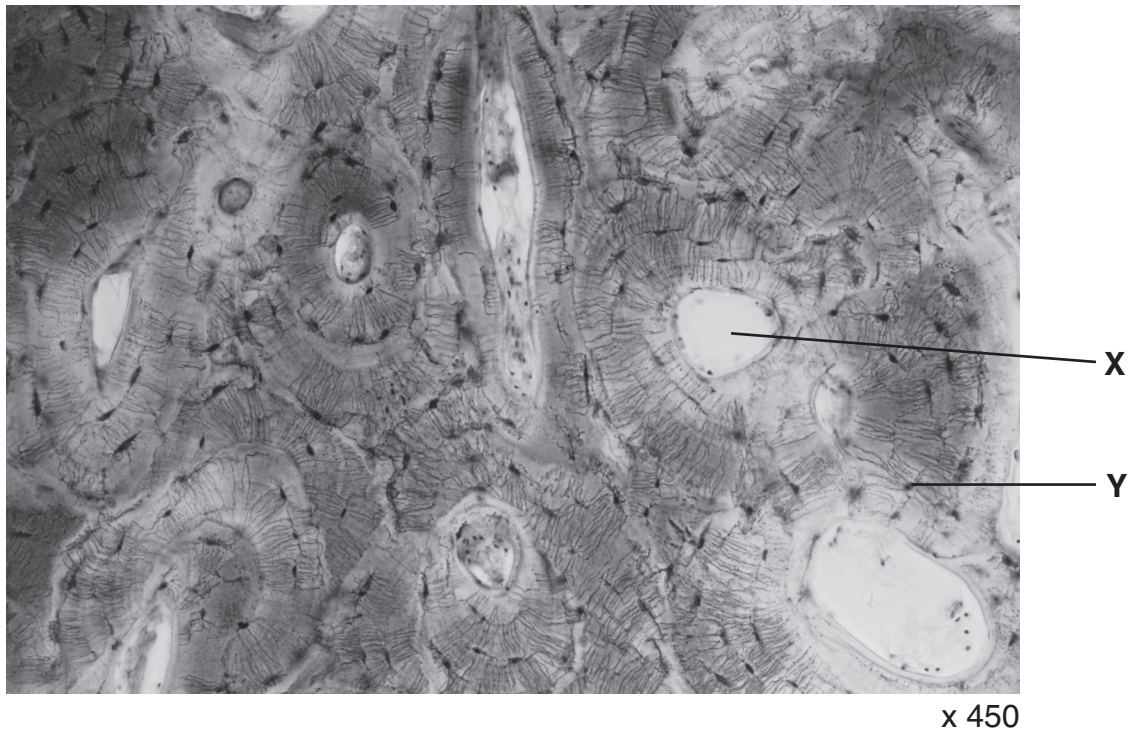


Fig. 3.2

(c) Name **X** and **Y**.

X

Y [2]

Compact bone is a living tissue.

(d) Suggest the role of **X** in compact bone.

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..... [2]

(e) State **two** ways in which hyaline cartilage differs from bone.

1.....

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..... [2]

- (f) As a person ages, *osteoporosis* may occur in the bones. 'Senescent osteoporosis' may result in hip fractures. This occurs more commonly in women than in men.

Describe what takes place in the limb when osteoporosis occurs **and** explain its possible causes.

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..... [4]

[Total : 17]

- 4 (a) Fig. 4.1 shows the major components of the mammalian nervous system.

Complete Fig. 4.1 using the terms from the list below.

autonomic nervous system
cerebellum
spinal cord
cerebrum
peripheral nervous system

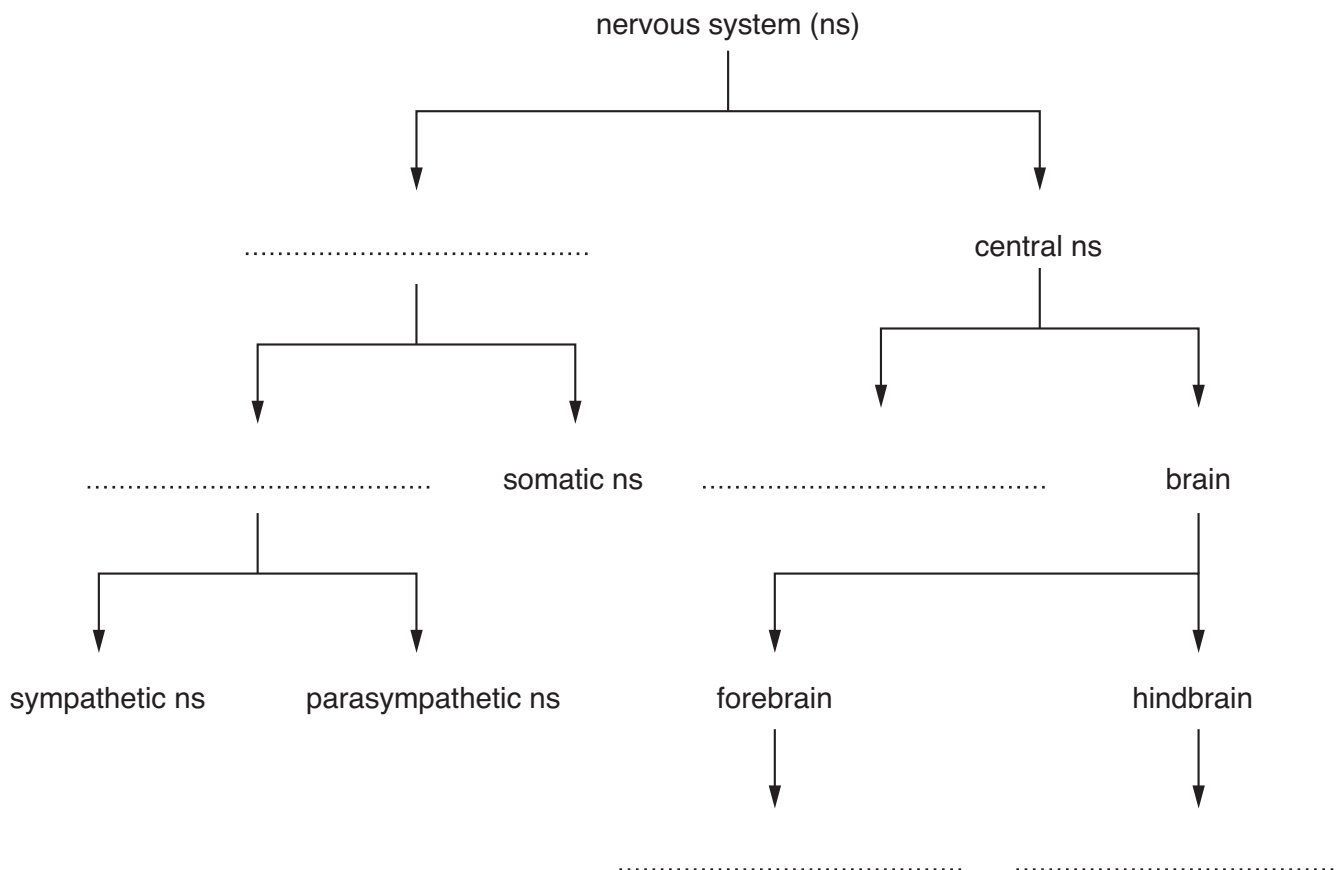


Fig. 4.1

[5]

- (b) The brain consists of white matter, containing myelinated neurones, and grey matter, containing unmyelinated neurones.

Explain the advantage of a neurone being myelinated.

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..... [2]

- (c) Cerebrospinal fluid (CSF) is formed by filtration of the blood. It bathes brain tissues, removing metabolites and excess heat, before returning into the bloodstream. CSF is similar to blood but contains no blood cells or plasma proteins. The main component of CSF is water.

(i) Explain how CSF is able to remove excess heat from the brain.

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..... [2]

(ii) Explain, using the term **water potential**, how CSF is returned into the bloodstream.

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..... [3]

QUESTION 4(d) STARTS ON PAGE 16

- (d) Hydrocephalus is a disease in which children produce a large volume of CSF, which accumulates, putting pressure on the brain and causing damage to neurones. Table 4.1 shows how hydrocephalus affects the total amount of white and grey matter within the cerebrum.

Table 4.1

	mean total amount of white and grey matter as a percentage of cerebrum volume	
region of cerebrum	unaffected children	children with hydrocephalus
front	88.8	90.7
middle	90.4	85.3
rear	90.7	84.0

Children with hydrocephalus show the following features:

- poor understanding of written and spoken words
- loss of fine motor skills
- poor memory of objects
- normal hearing
- normal speech production.

Suggest, using information from Fig. 4.1 and Table 4.1, the features seen in children with hydrocephalus.

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..... [4]

[Total : 16]

- 5 (a) Reflex actions form an important part of a mammal's behaviour.

All newly born chimpanzees display the 'grip reflex' by holding onto an object with their hands.

The grip reflex is always made in the same way in response to the presence of any object near to the young chimp.

- (i) Explain why the grip reflex is an example of an innate behaviour.

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..... [2]

- (ii) Suggest **two** advantages of the grip reflex to the young chimps.

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..... [2]

QUESTION 5(b) STARTS ON PAGE 18

- (b) Fig. 5.1 shows a piece of apparatus called a puzzle box, used by Edward Thorndike to investigate operant conditioning in animals.

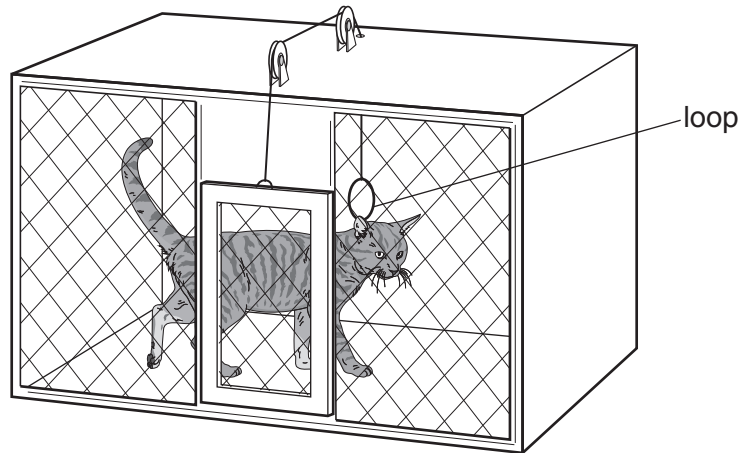


Fig. 5.1

During an experimental trial, a cat was placed inside the puzzle box. If the cat pulled the loop with its mouth or a paw, the door opened and it could escape. The time taken for the cat to escape was recorded. The experiment was then repeated several times with the same cat.

Fig. 5.2 shows a graph of the time taken for the cat to escape from the puzzle box during repeated trials.

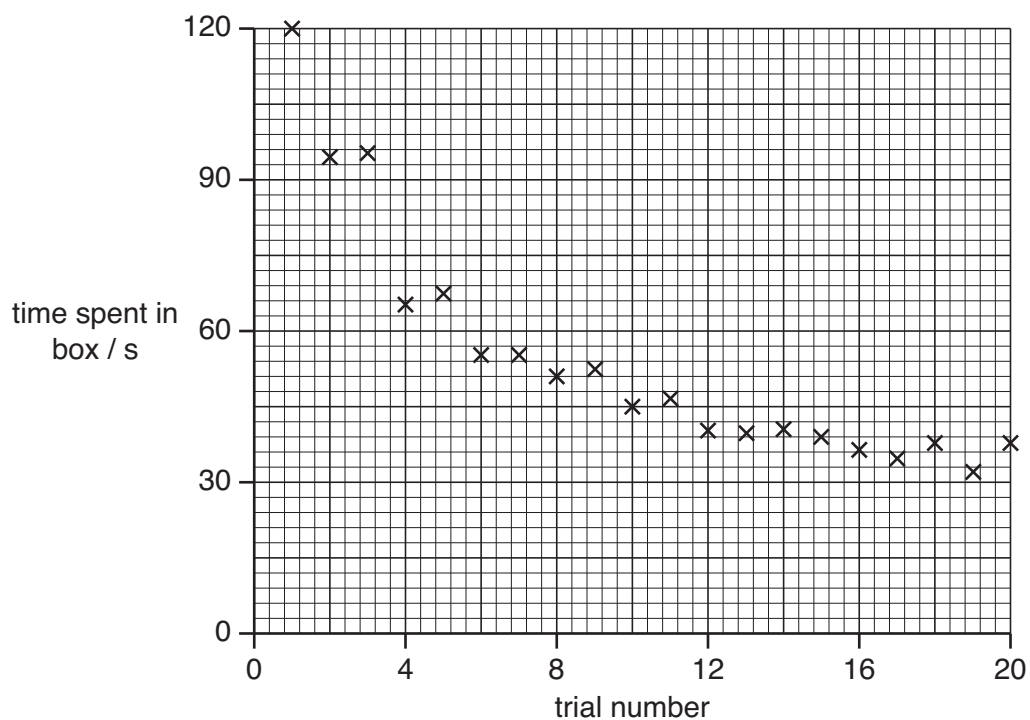


Fig. 5.2

In this question, one mark is available for the quality of spelling, punctuation and grammar.

Describe **and** explain the data shown in Fig. 5.2.

Include in your answer a reason why the type of learning shown by the cat is operant conditioning.

..... [7]

Quality of Written Communication [1]

[Total : 12]

Turn over

20
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6 Fig. 6.1 shows the main structures of the human ear.

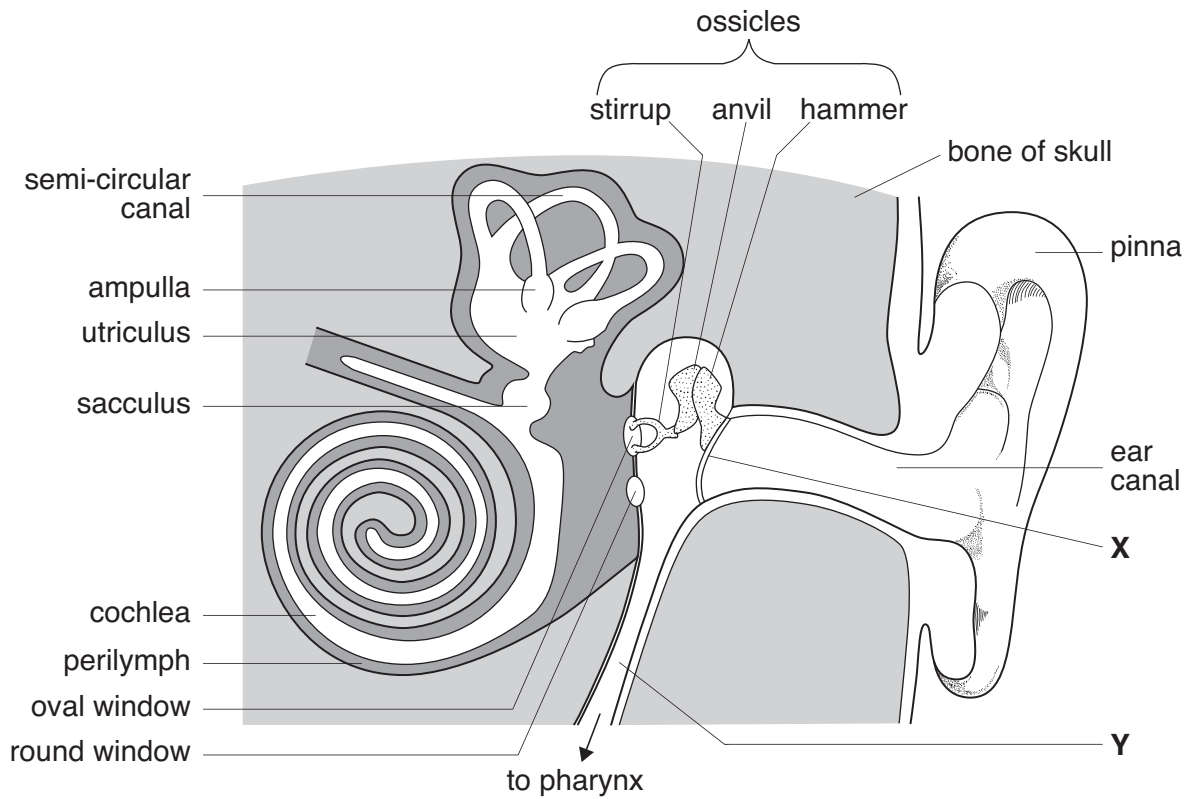


Fig. 6.1

(a) Name structures X and Y and state their roles.

X

role

.....

Y

role

..... [4]

QUESTION 6(b) STARTS ON PAGE 22

- (b) Muscles are attached to the auditory ossicles. When the ear detects very loud sounds, these muscles are stimulated to contract. Suggest **one** advantage of this.

.....

 [1]

- (c) Hearing tests were carried out on three people. Each person was exposed to individual sounds of different frequencies. Each sound was delivered at an increasing volume until the person indicated that they could hear the sound.

The results of these hearing tests are shown in Fig. 6.2.

Each plotted point indicates the **lowest volume** of each frequency of sound that could be heard by each person.

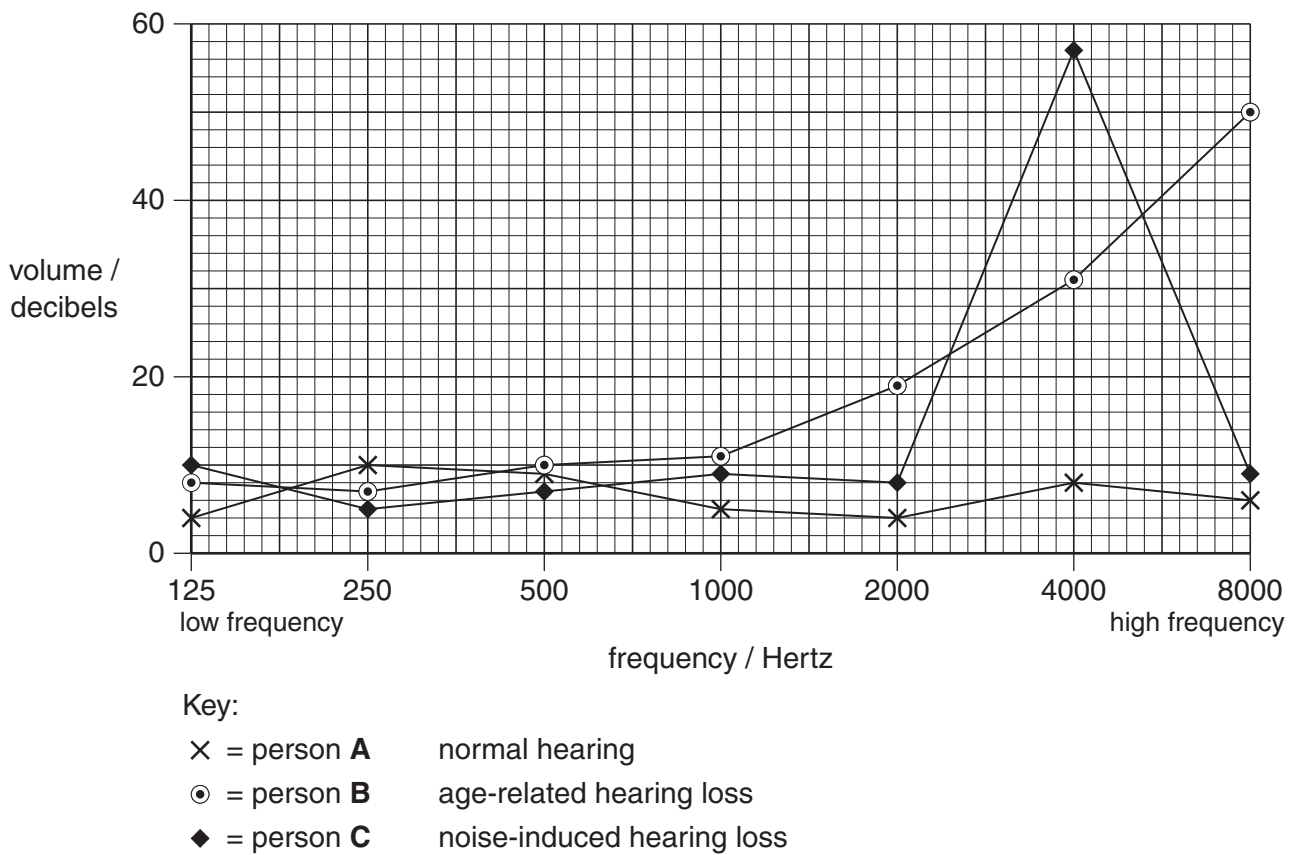


Fig. 6.2

- (i) Using data from Fig. 6.2, compare the results of the hearing tests for persons **A**, **B** and **C**.

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..... [3]

- (ii) Explain the reason for the hearing loss shown by person **C**.

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..... [2]

- (iii) Suggest **two** factors that should be controlled when the hearing tests are carried out in order to collect valid data.

1

2 [2]

[Total : 12]

END OF QUESTION PAPER

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