14. Coordination and response

14.1 Coordination and response

Paper 3 and 4

Question Paper

Paper 3

Questions are applicable for both core and extended candidates

1 **(a)** Fig. 8.1 is a diagram representing a reflex action.

When the knee is tapped with a small rubber hammer, the leg will immediately straighten.

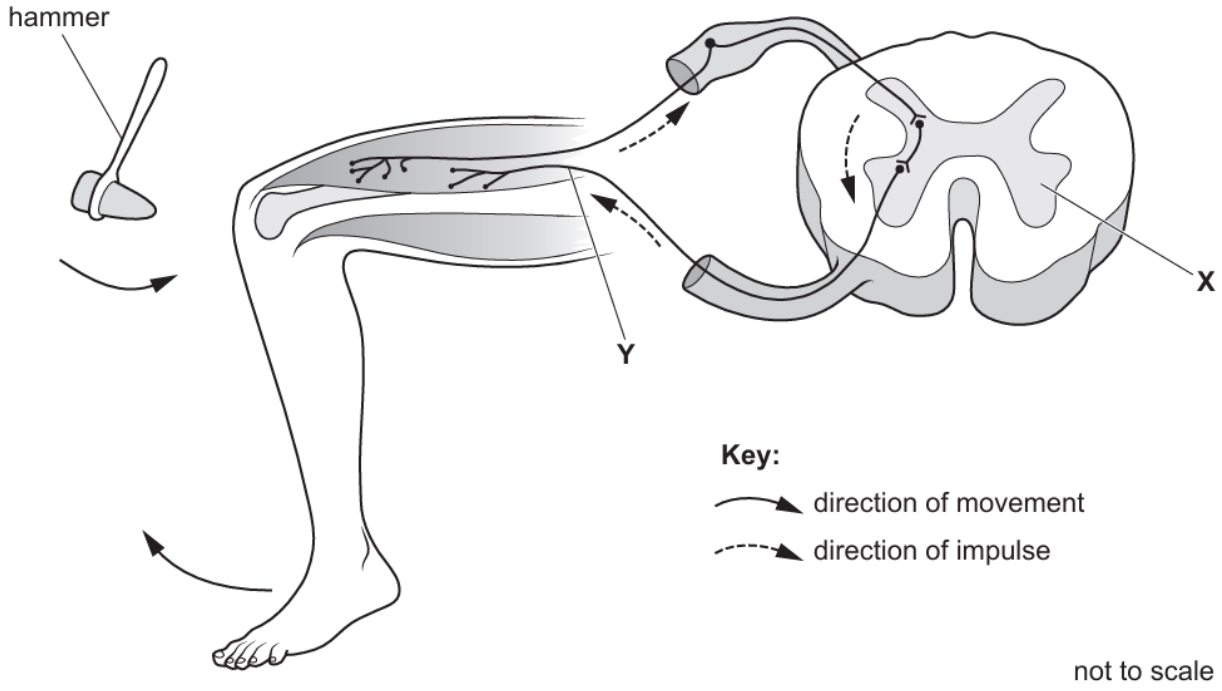


Fig. 8.1

(i) Identify the parts labelled **X** and **Y** in Fig. 8.1.

X .....

Y .....

[2]

(ii) State the name of the effector in the example shown in Fig. 8.1.

..... [1]

(iii) Describe the stimulus in the example shown in Fig. 8.1.

.....

.....

..... [1]

(iv) State **two** features of reflex actions.

1 .....

2 .....

[2]

(b) The shortest neurones in the human body are 0.0004 mm.

The longest neurones are 1.5 m.

Calculate how many times longer the longest neurones are than the shortest.

Space for working.

.....

[2]

(c) State the name given to the junction between neurones.

..... [1]

[Total: 9]

2 **(a)** Fig. 9.1 contains some information about a reflex action.

A person touches a hot pan. **Electrical impulses travel to the central nervous system which coordinates a response.** **The muscles in the arm contract quickly.**

Fig. 9.1

(i) State the name of the stimulus from the example given in Fig. 9.1.

..... [1]

(ii) State the name of the effector from the example given in Fig. 9.1.

..... [1]

(iii) State the names of the **two** parts of the central nervous system.

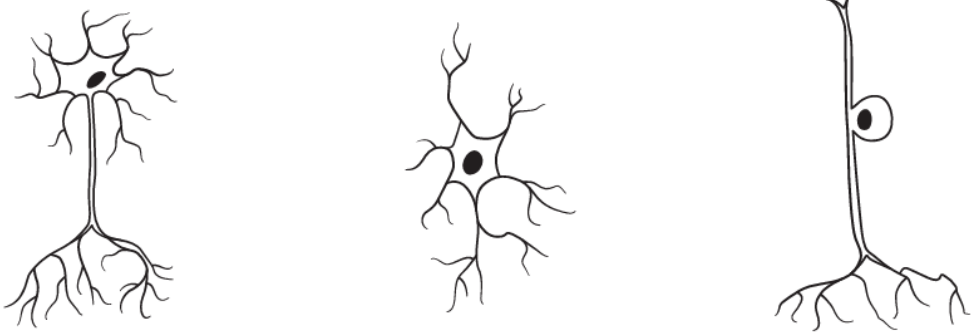
1 .....

2 .....

[2]

(b) Fig. 9.2 shows diagrams of three types of neurones.

State the names of the three types of neurones on the lines provided in Fig. 9.2.



....

not to scale

Fig. 9.2

[3]

(c) State the name given to the junction between two neurones.

..... [1]

[Total: 8]

3 **(b)** The box on the left shows the beginning of a sentence.

The boxes on the right show some sentence endings.

Draw **three** straight lines to make three correct sentences about the brain.

The brain	and spinal cord are part of the peripheral nervous system.
	coordinates body functions.
	contains receptors that detect the temperature of the blood.
	produces insulin.
	receives impulses from motor neurones.
	receives impulses from the optic nerve.

[3]

4 **(a)** Fig. 9.1 is a flow chart showing the pathway of a reflex action.

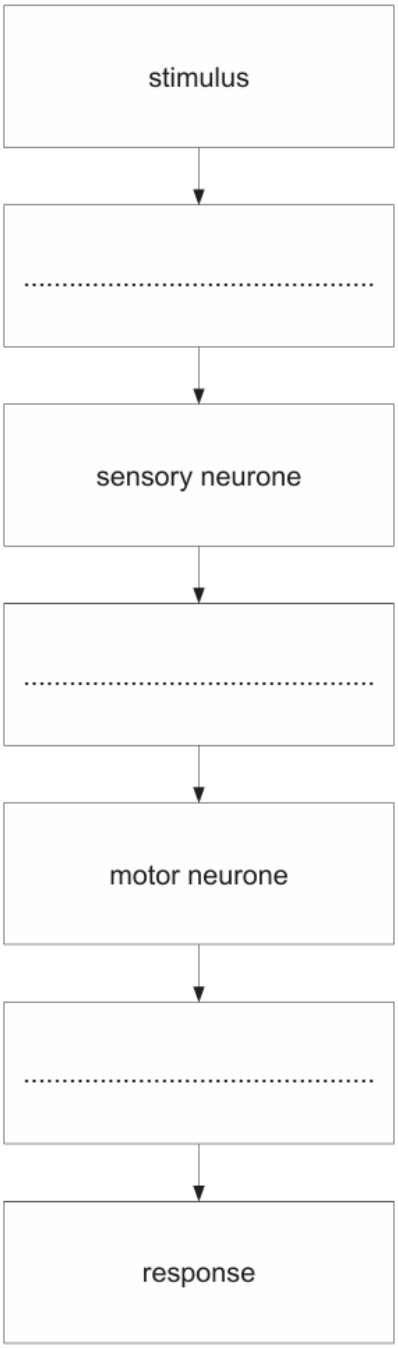


Fig. 9.1

Complete the missing parts of the reflex action pathway in Fig. 9.1. [3]

(b) The box on the left contains the beginning of a sentence.

The boxes on the right show some endings of sentences.

Draw lines to make **three** correct sentences about reflex actions.

Reflex actions	are automatic.
	are slow.
	coordinate stimuli with responses.
	do not involve synapses.
	involve the central nervous system.
	occur only in plants.

[3]

[Total: 6]

5 **(a)** Table 8.1 contains three descriptions of nervous system terms.

Complete Table 8.1 by stating the name of the terms described.

Table 8.1

description of the term	name of the term
neurone that is connected to a muscle	
electrical signal that passes along a neurone	
junction between two neurones	

[3]

(b) The nervous system contains sense organs that detect changes in the external environment.

List **three** stimuli that are detected by sense organs.

1 .....

2 .....

3 .....

[3]

(c) Describe a simple reflex arc.

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.....

.....

.....

..... [4]

[Total: 10]

6 This question is about neurones and reflex actions.

Choose words from the list to complete the sentences.

Each word may be used once, more than once, or not at all.

endocrine **fast** **impulses**

motor **nervous** **receptor** **sensory**

slow **stimuli** **synapses**

Neurones are cells that are part of the ..... system.

There are three types of neurone involved in a simple reflex action: a sensory neurone, a relay neurone and a ..... neurone.

The nerves conduct electrical ..... . These are transmitted from one neurone to the next at junctions called ..... .

A reflex action is automatic, co-ordinated and ..... .

[5]

[Total: 5]

Paper 4

Questions are applicable for both core and extended candidates unless indicated in the question

7 **(b)** Fig. 2.1 shows the structure of the eye. It also shows the pathway taken by nerve impulses which help bring about changes in the eye in order to bring light to a focus.

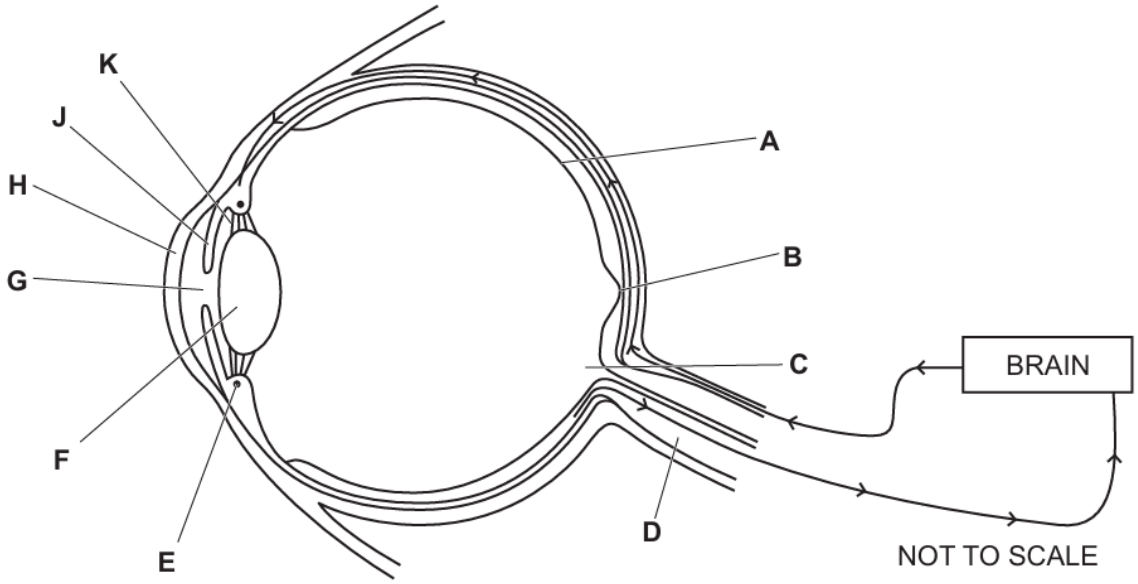

Fig. 2.1

(i) Draw a label line and a letter **X** on Fig. 2.1 to identify a motor neurone.

[1]

(ii) Describe how the events that occur at a synapse generate an impulse in the next neurone.

(extended only)

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..... [3]

(iii) Describe **and** explain the process of accommodation in the eye to view a near object.

Use the letters in Fig. 2.1 in your answer. **(extended only)**

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..... [4]

8 **(a)** Complete the sentence about the mammalian nervous system.

The ..... nervous system consists of the brain and spinal cord and the ..... nervous system consists of the nerves outside the brain and spinal cord.

[1]

(b) Fig. 4.1 shows the parts of a reflex arc.

M	effector
N	motor neurone
P	receptor cell
Q	relay neurone
R	response
S	sensory neurone
T	stimulus

Fig. 4.1

(i) Put the parts listed in Fig. 4.1 into the correct sequence, and write the letters in the boxes.

Two have been done for you.

T						**R**

[2]

(ii) State **two** stimuli that are detected by the skin.

1 .....

2 .....

[2]

(iii) The pupil reflex controls the amount of light that enters the eye.

State the name of an effector in the pupil reflex.

..... [1]

(c) Describe and explain how impulses are **only** passed in one direction from one neurone to the next. **(extended only)**

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..... [5]

9 Fig. 3.1 is a diagram of the junction between two neurones in a healthy person.

Fig. 3.2 is a diagram of the junction between the same two neurones in a person who has Parkinson's disease. This disease affects the nervous system.

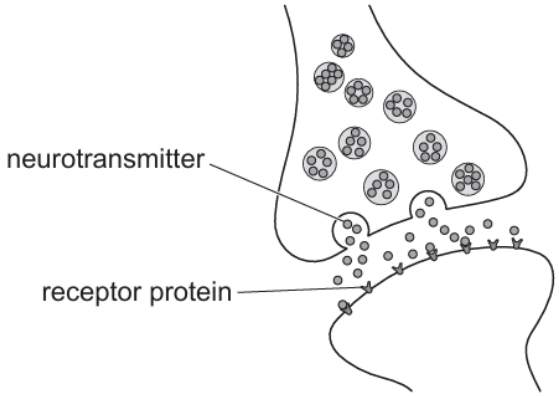

Fig. 3.1

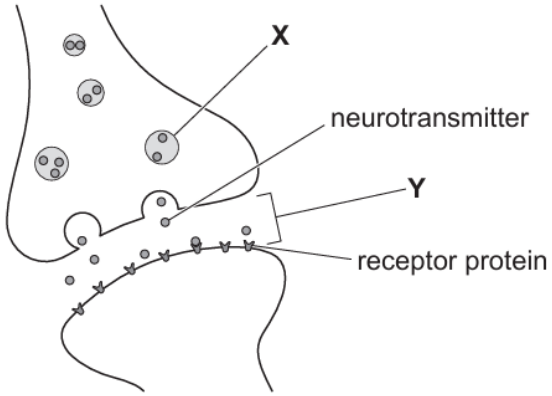

Fig. 3.2

(a) Identify the parts labelled **X** and **Y** in Fig. 3.2. **(extended only)**

X .....

Y .....

[2]

(b) Parkinson's disease affects neurones in the brain that are responsible for movement.

Using the information in Fig. 3.1 and Fig. 3.2, suggest **and** explain the effect of Parkinson's disease on a person's movement. **(extended only)**

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..... [5]

10 **(a)** Complete the sentence about the nervous system.

The brain and spinal cord form the ..... nervous system and the nerves coming into and out of the spinal cord are part of the ..... nervous system. [1]

11 Involuntary actions occur because nerve impulses travel along the components of reflex arcs.

An example of an involuntary action is the rapid movement of a hand after unexpectedly touching a very hot object.

Fig. 4.1 shows the structures that are involved in the movement of the hand.

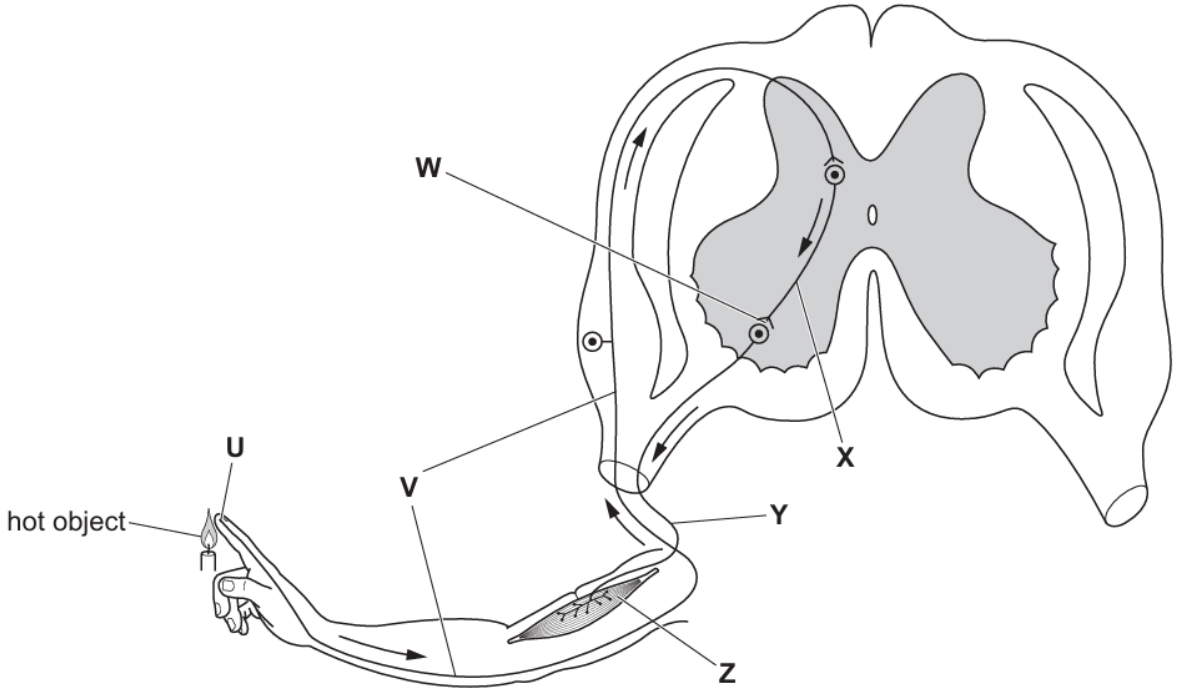

Fig. 4.1

(a) Table 4.1 shows the functions of some of the structures shown in Fig. 4.1, the names of the structures and the letter from Fig. 4.1 that identifies each structure.

Complete Table 4.1.

Table 4.1

function	name	letter on Fig. 4.1
conducts impulses to central nervous system (CNS)		
conducts impulses to an effector		
conducts impulses only within the CNS		
	receptor	
		Z

[5]

(b) Fig. 4.2 shows the structure of the synapse at **W** on Fig. 4.1.

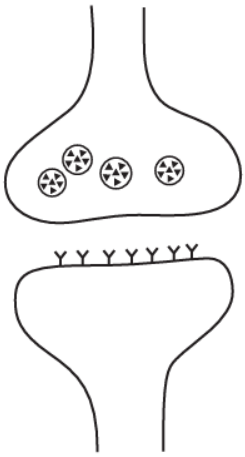

Fig. 4.2

Describe how an impulse travels across the synapse shown in Fig. 4.2. **(extended only)**

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..... [4]

12 **(f)** Fig. 2.2 shows the junction between two neurones with drug **X** absent and two neurones with drug **X** present, immediately after a painful stimulus.

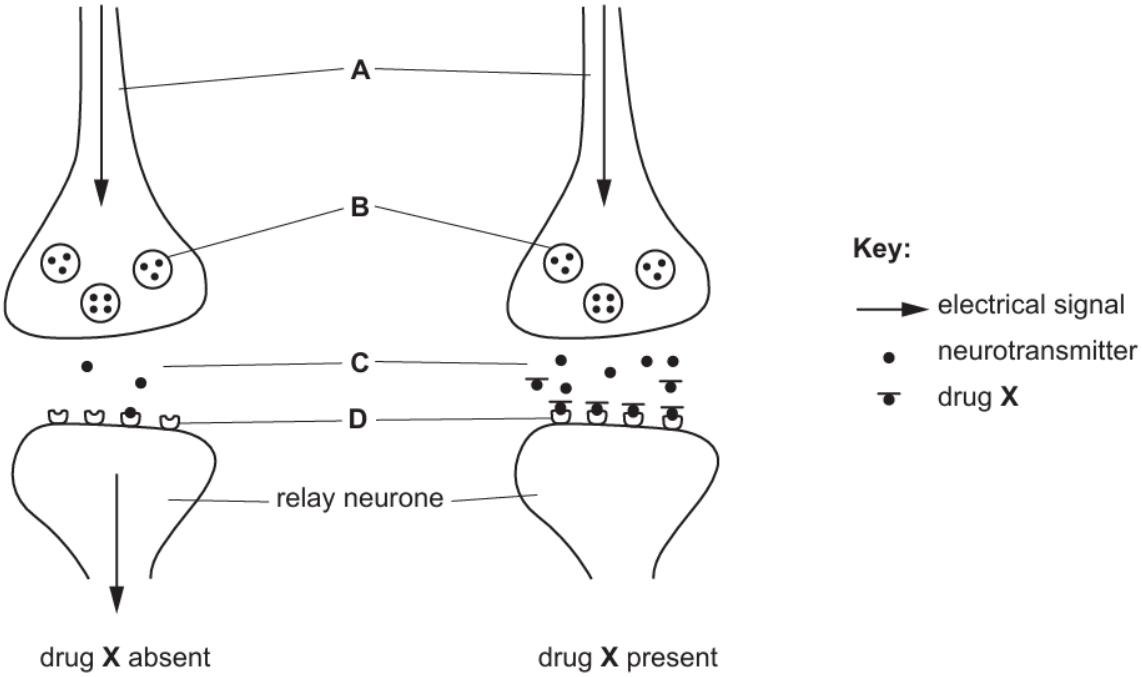

Fig. 2.2

(i) State the names of **A**, **B**, **C** and **D** in Fig. 2.2. **(extended only)**

A .....

B .....

C .....

D .....

[4]

(ii) Describe **and** explain how drug **X** affects the function of the relay neurone shown in Fig. 2.2. **(extended only)**

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..... [3]

13 **(c)** Fig. 3.1 shows the junction between two neurones.

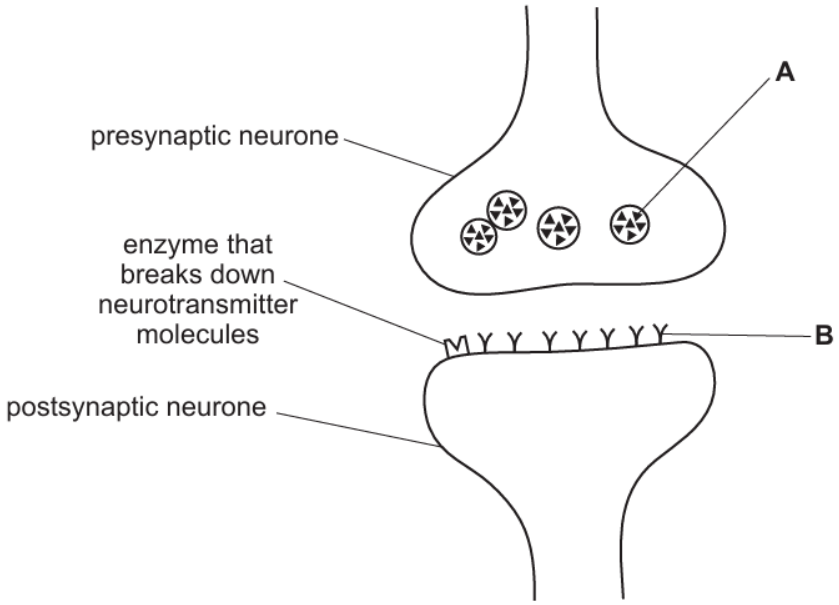

Fig. 3.1

Many drugs interfere with the action of neurotransmitters at the junctions between neurones.

Two drugs that influence the transmission of impulses between neurones are atropine and eserine. The actions of these drugs are shown in Table 3.1.

Table 3.1

drug	action at junctions between neurones
atropine	blocks receptor molecules for neurotransmitters
eserine	blocks the enzyme that breaks down neurotransmitters

Explain the effects of these two drugs on the nervous system using the information in Fig. 3.1 and Table 3.1. **(extended only)**

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..... [6]

14 Neurones are part of the nervous system. Neurones are connected to each other by synapses.

(a) **(i)** Describe how the structure of a neurone is related to its function.

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..... [3]

(ii) The nervous system is made up of the central nervous system and the peripheral nervous system.

State the names of the organs that make up the central nervous system.

..... [1]

(b) Reflex actions allow the body to respond rapidly to changes in the external environment.

(i) Outline the pathway in a reflex arc in response to shining a bright light into the eye.

(extended only)

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..... [3]

(ii) Doctors sometimes check the reflexes of people who are unconscious.

Suggest why reflexes occur in people who are unconscious.

..... [1]

(c) Fig. 4.1 is a diagram of a synapse and parts of two neurones.

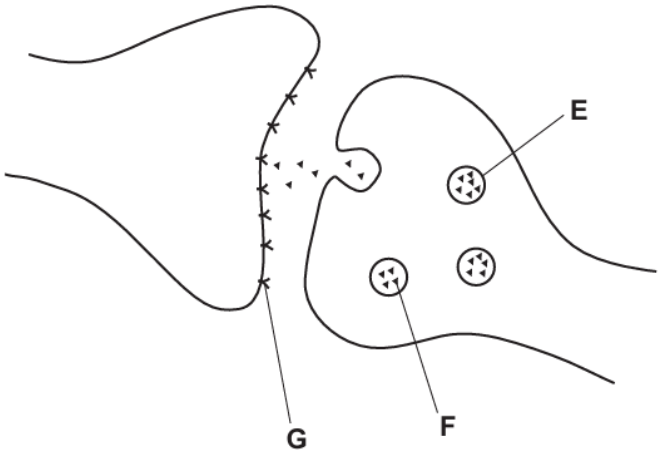

Fig. 4.1

(i) State the names of the labelled parts in Fig. 4.1. **(extended only)**

E .....

F .....

G .....

[3]

(ii) Draw an arrow on Fig. 4.1 to show the direction in which the signal travels across the synapse. **(extended only)** [1]

15 **(d)** Body temperature is controlled by both hormones and nerves.

Explain how co-ordination by hormones differs from co-ordination by nerves.

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.....[3]