AQA GCSE Biology | 8461

SPECIFICATION POINT 4.5.2.1

Structure and function

Past-paper questions

Tier	**Higher**
Question groups	**27**
Available paper years	**2007–2025**

Using this booklet

1. Answer the questions in order and show your working.
2. Original question numbers and marks are retained.
3. Print at actual size (100%) for measuring questions.
4. Use the companion answer booklet to check your work.

Name: _____ **Date:** _____

Whole questions are retained for context, so some parts assess other specification points. Current and legacy sources are labelled. Continue on extra paper if needed.

4.5.2.1 Structure and function

Question 01

March 2007 | BLY1A | Original Q6 | Legacy

QUESTION SIX

6A If dust gets in our eyes, we blink.

This automatic action is called . . .

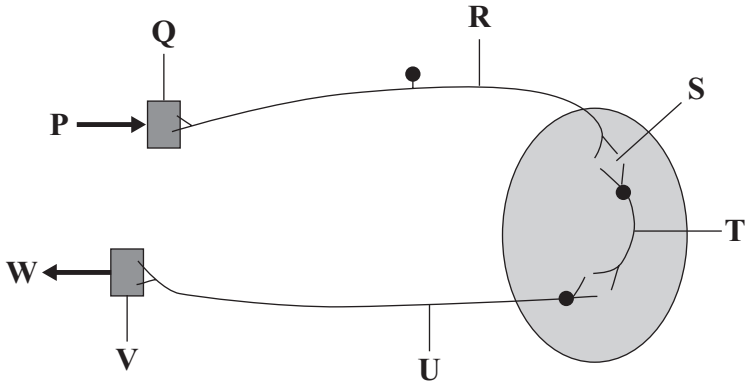
1 a motor action.

2 a reflex action.

3 a relay action.

4 a stimulus.

The diagram represents this action.



6B Which part of the diagram represents the effector in this action?

1 **P**

2 **Q**

3 **V**

4 **W**

6C Which part of the diagram represents a relay neurone?

1 **R**

2 **S**

3 **T**

4 **U**

4.5.2.1 Structure and function

Question 01 · continued

6D A chemical is released when impulses are sent . . .

1 along **T**.

2 from **R** to **Q**.

3 from **R** to **T**.

4 from **T** to **R**.

Turn over for the next question

4.5.2.1 Structure and function

Question 02

June 2007 | BLY1A | Original Q6 | Legacy

QUESTION SIX

6A What is a reflex action?

1 a stimulus that causes a rapid response

2 a stimulus that can be controlled

3 a deliberate response to a stimulus

4 an automatic rapid response to a stimulus

6B The function of a synapse is to . . .

1 detect changes in pressure.

2 detect changes in temperature.

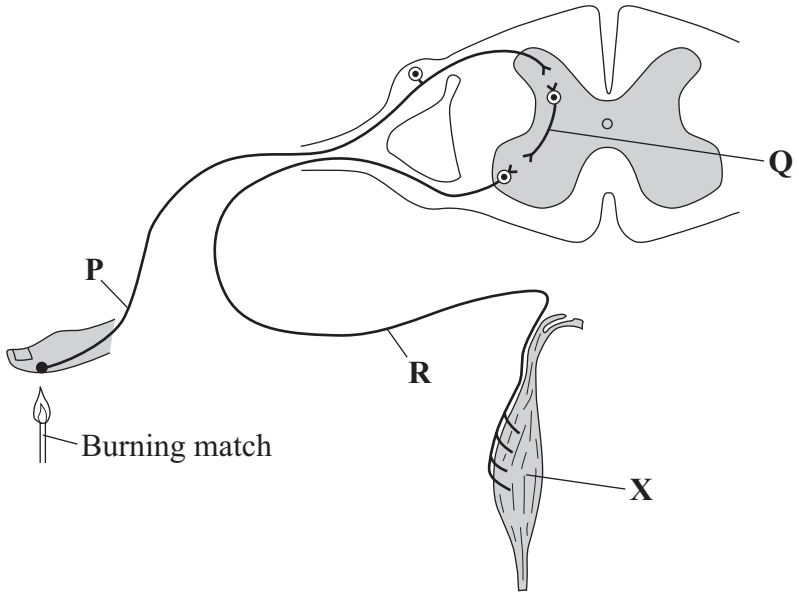
3 produce nerve impulses along a sensory neurone.

4 transfer impulses from one neurone to another.

4.5.2.1 Structure and function

Question 02 · continued

A person accidentally puts a hand close to a burning match. The hand automatically moves away from the flame. The diagram shows the parts involved in this reflex action.



6C Which line, **1, 2, 3** or **4,** in the table correctly identifies the neurones in this reflex pathway?

	Sensory neurone	Relay neurone	Motor neurone
1	Q	R	P
2	P	Q	R
3	P	R	Q
4	R	Q	P

6D Structure **X** is . . .

1 a gland

2 an effector

3 a bone

4 a receptor

4.5.2.1 Structure and function

Question 03

November 2007 | BLY1A | Original Q8 | Legacy

QUESTION EIGHT

This question is about reflex actions.

8A Which of the following best describes reflex actions?

1 Each reflex action is coordinated by both the brain and the spinal cord.

2 They always involve the spinal cord.

3 They are rapid, voluntary responses to a stimulus.

4 They involve receptors, effectors and neurones.

8B Which of the following is true of synapses?

1 They are found only in receptor organs.

2 They detect changes in the environment.

3 They transfer impulses from one neurone to another.

4 They transfer nerve impulses along motor neurones.

8C In a reflex pathway, relay neurones . . .

1 pass impulses from effectors to motor neurones.

2 pass impulses from effectors to sensory neurones.

3 pass impulses from receptors to motor neurones.

4 pass impulses from sensory neurones to motor neurones.

4.5.2.1 Structure and function

Question 03 · continued

8D A person accidentally puts their finger in a flame on a cooker. They quickly pull their hand away.

Which line in the table is true of this reflex?

	Sensory neurone	Motor neurone	Effector	Receptor
1	passes from finger to spinal cord	passes from finger muscle to spinal cord	found in finger	found in arm muscle
2	passes from skin to spinal cord	passes from spinal cord to finger muscle	found in finger muscle	found in skin
3	passes from skin to arm muscle	passes from skin to finger muscle	found in arm muscle	found in arm muscle
4	passes from skin to spinal cord	passes from spinal cord to arm muscle	found in arm muscle	found in skin

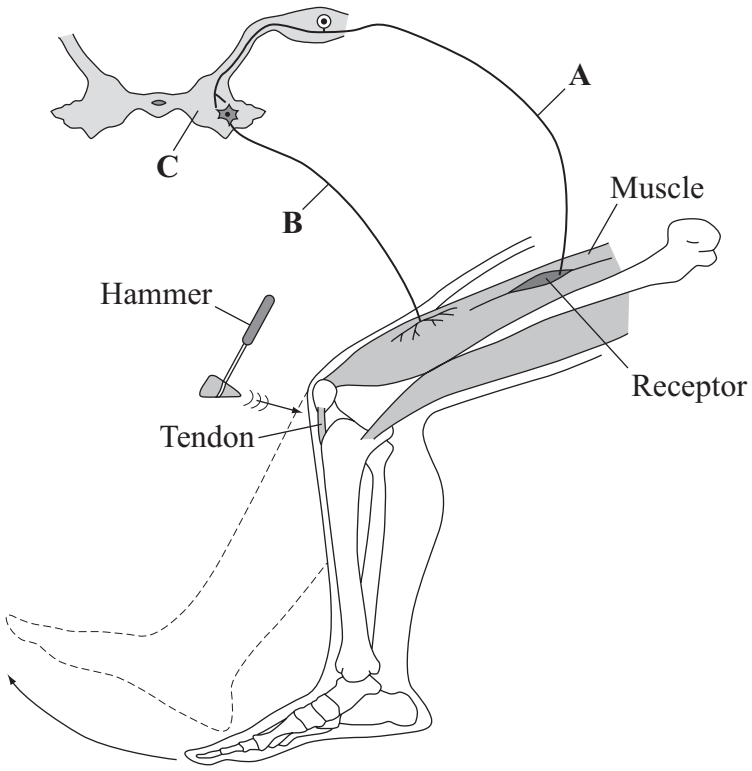
Turn over for the next question

4.5.2.1 Structure and function

Question 04

January 2008 | BLY1H | Original Q3 | Legacy

3 The diagram shows the structures involved in the knee-jerk reflex. When the tendon is struck with the hammer, the receptor is stimulated and the lower leg moves forward.



(a) Name the structures labelled **A**, **B** and **C**.

A .....

B .....

C .....

(3 marks)

(b) How is information passed from structure **A** to structure **B**?

.....

.....

(1 mark)

(c) What is the effector in this response?

.....

(1 mark)

5

4.5.2.1 Structure and function

Question 05

March 2008 | BLY1AP | Original Q9 | Legacy

QUESTION NINE

Some drugs are used in medicine because they affect reflex pathways.

9A In the 1940s, the drug curare was introduced because it prevents muscles from contracting, thereby making surgery easier.

At what place in a reflex action does curare most probably act?

1 the junction of receptors and sensory neurones

2 between relay neurones in the brain

3 the junction of a motor neurone and a sensory neurone

4 the junction of a muscle and motor neurone

Dentists inject the drug procaine into gums so that they can drill into teeth without causing pain.

9B What is the most probable reason for procaine preventing pain?

1 It prevents impulses passing along the sensory neurones to the brain.

2 It blocks the synapses between sensory neurones and motor neurones.

3 It makes the tissue of the gums numb.

4 It prevents the brain from interpreting impulses from the teeth.

9C What would be the best way of investigating the effects of drugs such as procaine on the human nervous system?

1 test the effects of drugs on animals

2 test the effects of drugs on healthy human volunteers

3 observe the effects of drugs on addicts

4 test the effects of drugs on people with diseases of the nervous system

9D A manufacturer tests a new drug that affects the nervous system and makes claims about its effectiveness.
The credibility of the claim is decreased because . . .

1 the drug was tested on a wide range of age groups.

2 the drug was tested only by the manufacturer.

3 some of the test subjects were given placebos.

4 only volunteers were used in the test.

END OF TEST

4.5.2.1 Structure and function

Question 06

June 2008 | BLY1AP | Original Q2 | Legacy

QUESTION TWO

Reflex actions are automatic and happen very quickly in order to protect the body from harm.
For example, if you step on a drawing pin, you pull your foot away quickly.



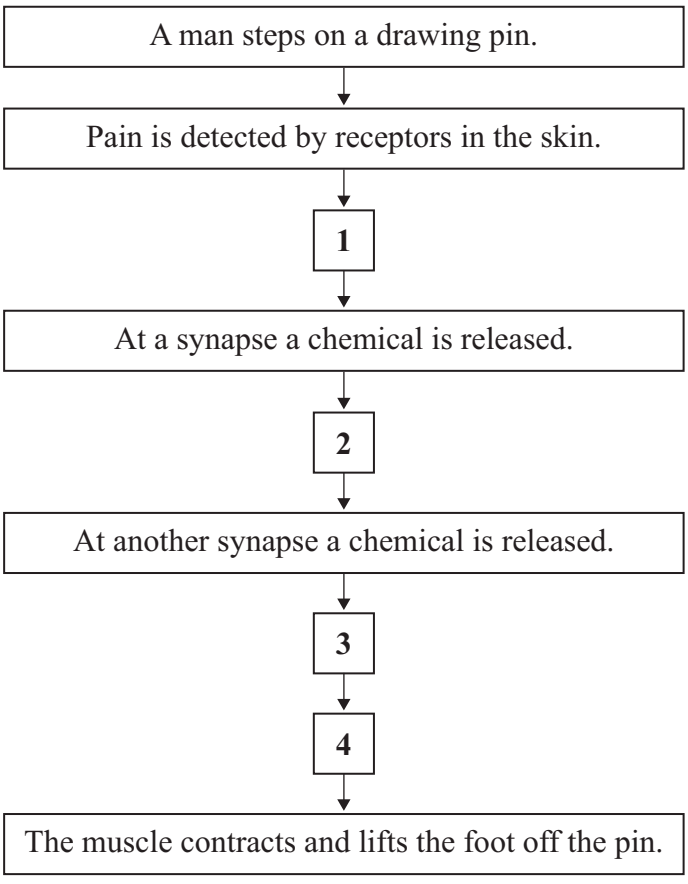
Match statements, **A**, **B**, **C** and **D**, with the numbers **1–4** in the flow chart to explain what happens in the nervous system.

A an impulse reaches the effector in the leg

B an impulse passes along a relay neurone

C an impulse passes along a sensory neurone to the central nervous system

D an impulse passes along a motor neurone



4.5.2.1 Structure and function

Question 07

November 2008 | BLY1AP | Original Q7 | Legacy

QUESTION SEVEN

This question is about reflex actions.

7A Which of the following best describes reflex actions?

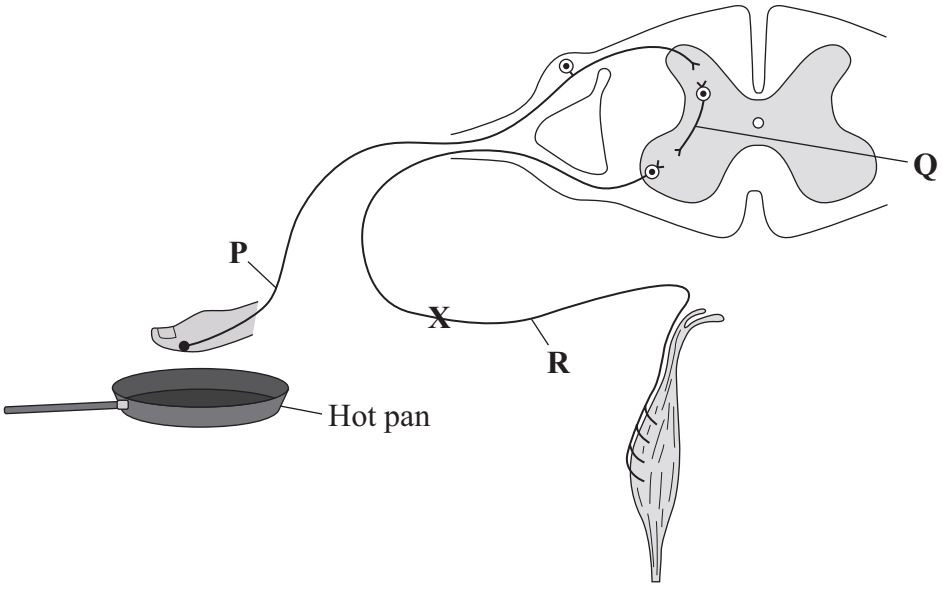
1 They are coordinated by both the brain and the spinal cord.

2 They are rapid, voluntary responses to a stimulus.

3 They involve receptors, effectors and neurones.

4 They always involve receptors and muscles.

A person accidentally touches a hot pan.
Her hand automatically moves away from the pan.
The diagram shows the parts involved in this action.



7B What types of neurone are **P** and **R**?

1 **P** is a relay neurone, **R** is a sensory neurone

2 **P** is a motor neurone, **R** is a sensory neurone

3 **P** is a sensory neurone, **R** is a relay neurone

4 **P** is a sensory neurone, **R** is a motor neurone

4.5.2.1 Structure and function

Question 07 · continued

7C Which row in the table shows how information passes from neurone **P** to neurone **Q** and from neurone **Q** to neurone **R**?

	From P to Q	From Q to R
1	chemical	impulse
2	impulse	impulse
3	chemical	chemical
4	impulse	chemical

7D In an accident, neurone **R** was cut at the point labelled **X**.

How would this affect the person?

1 The stimulus would still be detected and the muscle would contract.

2 The stimulus would still be detected but the muscle would **not** contract.

3 The stimulus would **not** be detected and the muscle would **not** contract.

4 The stimulus would **not** be detected but the muscle would contract.

4.5.2.1 Structure and function

Question 08

January 2009 | BLY1H | Original Q4 | Legacy

4 Reflex actions are rapid and automatic.

4 (a) Name the following structures in a reflex action.

4 (a) (i) The structure that detects the stimulus.

.....

(*1 mark*)

4 (a) (ii) The neurone that carries impulses to the central nervous system.

.....

(*1 mark*)

4 (a) (iii) The neurone that carries impulses away from the central nervous system.

.....

(*1 mark*)

4 (a) (iv) The structure that brings about the response.

.....

(*1 mark*)

4 (b) Describe what happens at a synapse when an impulse arrives.

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(2 marks)

4.5.2.1 Structure and function

Question 08 · continued

for mark

4 (c) Some people have a condition in which information from the skin does not reach the brain.

Explain why this is dangerous for the person.

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.....

(2 marks)

8

Turn over for the next question

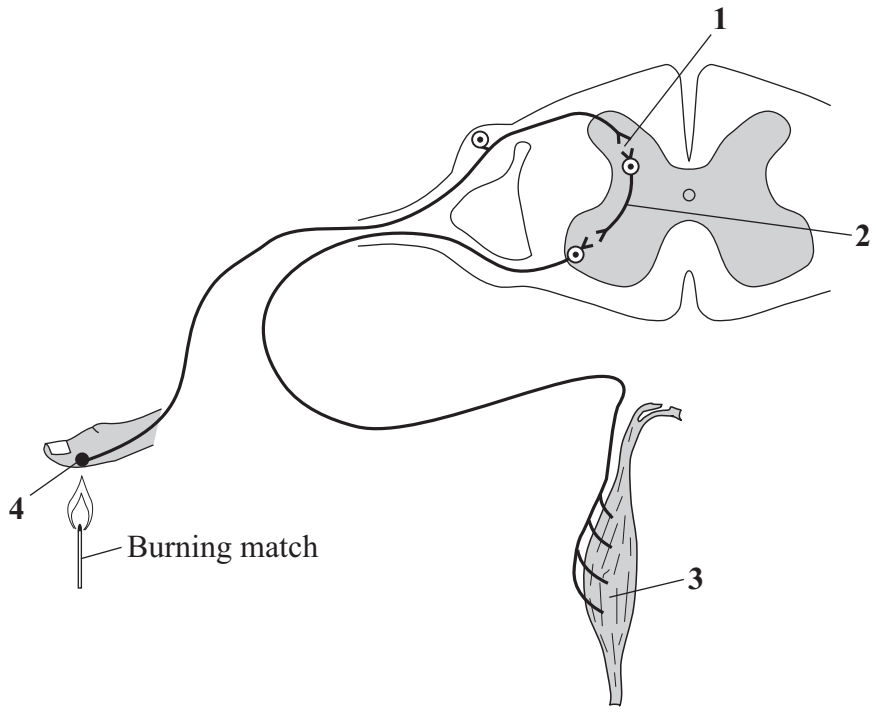
4.5.2.1 Structure and function

Question 09

March 2009 | BLY1AP | Original Q1 | Legacy

QUESTION ONE

A student accidentally puts his hand close to a burning match. His hand automatically moves away from the flame. The drawing shows the parts involved in this reflex action.



Match terms, **A**, **B**, **C** and **D**, with the labels **1–4** on the drawing.

A effector

B receptor

C relay neurone

D synapse

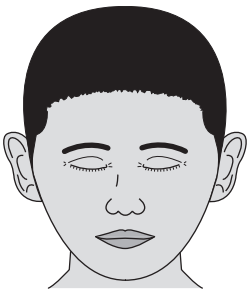
4.5.2.1 Structure and function

Question 10

June 2009 | BLY1AP | Original Q1 | Legacy

QUESTION ONE

A small insect flew into this boy's eye, making him blink.



Match words, **A**, **B**, **C** and **D**, with the numbers **1–4** in the sentences.

A motor neurone

B muscle

C sensory neurone

D synapse

An impulse from a receptor passes to the central nervous system along a . . . **1** . . . .

In the central nervous system, a chemical is released at a . . . **2** . . . .

The impulse then passes from the central nervous system to the eyelid along a . . . **3** . . . .

The blink is caused by the contraction of a . . . **4** . . . in the eyelid.

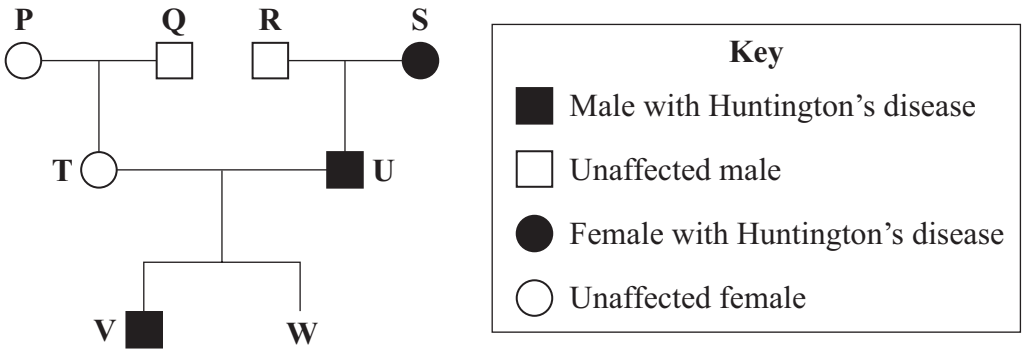
4.5.2.1 Structure and function

Question 11

June 2009 | BLY2H | Original Q6 | Legacy

6 Huntington's disease is a disorder of the nervous system. It is caused by a dominant allele.

The family tree shows the inheritance of Huntington's disease in one family.



6 (a) **T** and **U** already have a son, **V**, with Huntington's disease. What is the chance that their next child, **W**, will also develop Huntington's disease?

Use a genetic diagram in your answer.

Use the symbols **H** to represent the dominant allele and **h** to represent the recessive allele.

Chance that child **W** will have Huntington's disease = ...

(4 marks)

4.5.2.1 Structure and function

Question 11 · continued

for mark

6 (b) A doctor advises parents **T** and **U** that embryo **W** should be 'screened'.

6 (b) (i) What is embryo screening?

.....

.....

.....

(1 mark)

6 (b) (ii) Some people do not believe that embryos should be screened.

Give **one** reason why.

.....

.....

.....

(1 mark)

6 (c) Cystic fibrosis is an inherited disorder in which the person's mucus becomes thick.

6 (c) (i) For this gene, one allele in every 30 in the population is the cystic fibrosis allele. However, only one person in every 900 has cystic fibrosis.

Explain why.

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(2 marks)

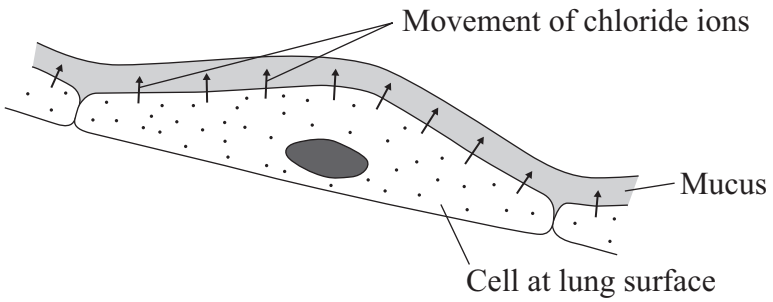
Question 6 continues on the next page

4.5.2.1 Structure and function

Question 11 · continued

for mark

6 (c) (ii) The diagram shows how, in a healthy person, cells at the lung surface move chloride ions into the mucus surrounding the air passages.



This movement of chloride ions causes water to pass out of the cells into the mucus.

Explain why.

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(3 marks)

6 (c) (iii) Mucus contains protein.

Which parts of the lung cells manufacture the protein in mucus?

.....

(1 mark)

12

4.5.2.1 Structure and function

Question 12

November 2009 | BLY1AP | Original Q5 | Legacy

QUESTION FIVE

The body responds to stimuli.

5A The skin has receptors that are sensitive to . . .

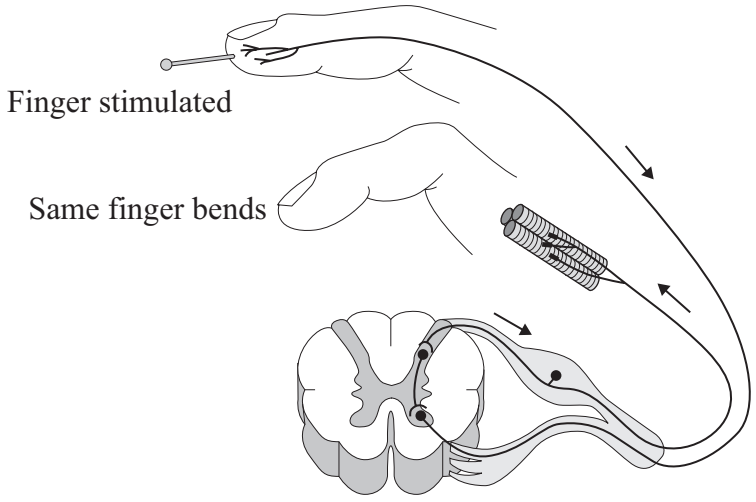
1 touch and pain only.

2 touch and pressure only.

3 touch, pressure and pain only.

4 touch, pressure, pain and temperature changes.

The diagram shows the pathway of nerve impulses in a reflex action.



5B The sequence of structures in the reflex arc are . . .

1 effector → sensory neurone → motor neurone → relay neurone → receptor

2 effector → sensory neurone → relay neurone → motor neurone → receptor

3 receptor → relay neurone → sensory neurone → motor neurone → effector

4 receptor → sensory neurone → relay neurone → motor neurone → effector

4.5.2.1 Structure and function

5C Relay neurones are found in . . .

1 glands.

2 the central nervous system.

3 the skin.

4 the muscles.

5D At the synapse between each of the neurones, . . .

1 a chemical is released that diffuses to the next neurone.

2 an electric impulse passes through the solution in the synapse.

3 a small electric current stimulates the next neurone.

4 the impulse jumps to the next neurone in the muscles.

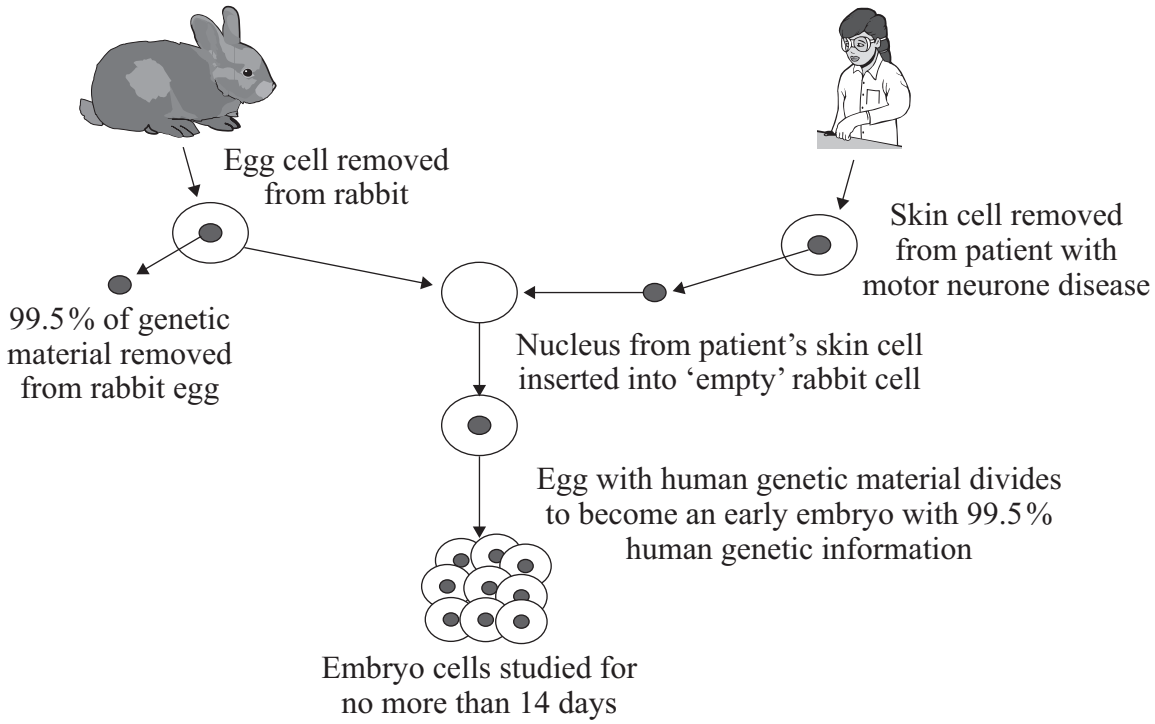
Turn over for the next question

4.5.2.1 Structure and function

Question 13

8 Scientists in Korea have discovered a method of producing rabbit–human embryos. Rabbit–human embryos could provide cells for research into human diseases such as motor neurone disease. Rabbits produce large numbers of eggs. Rabbit–human embryos could overcome a shortage of human embryo cells for research.

The diagram shows how rabbit–human embryos are produced.



8 (a) Which structures in the nucleus contain 99.5 % of a cell's genetic information?

.....

(1 mark)

4.5.2.1 Structure and function

Question 13 · continued

for mark

8 (b) Use the above information and your own knowledge and understanding to evaluate how the production of rabbit–human embryos may help research into human diseases.

Remember to give a conclusion as part of your evaluation.

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(4 marks)

5

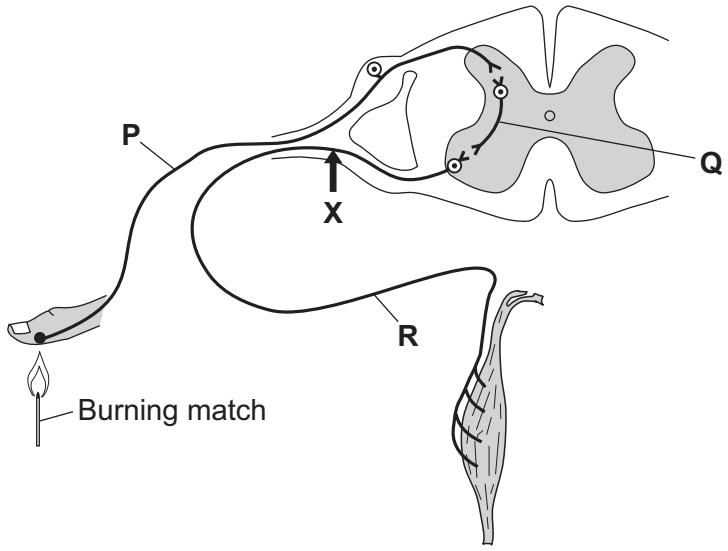
4.5.2.1 Structure and function

Question 14

June 2010 | BLY1AP | Original Q5 | Legacy

QUESTION FIVE

The diagram shows the structures involved in a reflex action.



5A What types of neurone are **P** and **Q**?

	P	Q
1	relay	sensory
2	motor	sensory
3	sensory	relay
4	sensory	motor

5B Which row in the table below shows how information passes between neurone **P** and neurone **Q**, and between neurone **Q** and neurone **R**?

	Between neurone **P** and neurone **Q**	Between neurone **Q** and neurone **R**
1	chemical	impulse
2	impulse	impulse
3	chemical	chemical
4	impulse	chemical

4.5.2.1 Structure and function

Question 14 · continued

5C In one person, the distance travelled by an impulse was found to be 1.5 m. The time taken for the impulse to travel this distance was 0.015 s. However, the time taken for a response to occur was 0.021 s.

What is the main reason for this difference?

1 It takes extra time for the brain to respond.

2 It takes extra time for information to cross synapses.

3 Information travels more slowly in the spinal cord.

4 Reflex actions can be slowed down by low body temperature.

5D In an accident, neurone **R** is cut at the point labelled **X** on the diagram.

How would this affect the person shown in the diagram?

1 The stimulus could be detected but the effector would not work.

2 The effector would work but the person could not detect the stimulus.

3 The effector would not work and the stimulus could not be detected.

4 The stimulus could be detected and the effector would work.

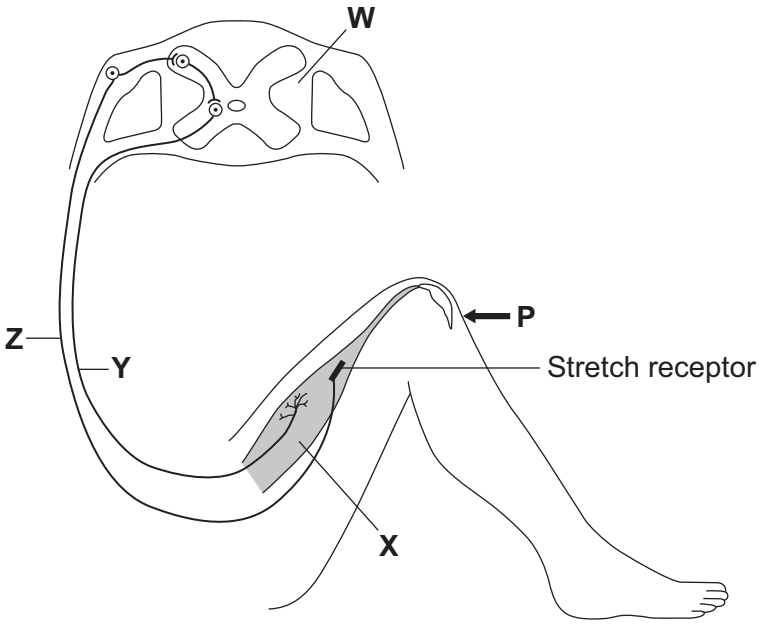
4.5.2.1 Structure and function

Question 15

November 2010 | BLY1AP | Original Q7 | Legacy

QUESTION SEVEN

The diagram shows the nervous pathway used to coordinate the knee-jerk reflex.
When the person is hit at point **P**, the lower leg is suddenly raised.



7A In this reflex action, the motor neurone is labelled . . .

1 **W**

2 **X**

3 **Y**

4 **Z**

7B In this reflex action, the effector is labelled . . .

1 **W**

2 **X**

3 **Y**

4 **Z**

4.5.2.1 Structure and function

Question 15 · continued

Read the newspaper article about an accident.

> A young man suffered terrible injuries when his motor cycle skidded off the road last night.
>
> The bones around part of his spinal cord were badly crushed and the spinal cord was damaged. The young man is not able to move his legs because of the damage to the spinal cord. He will have to use a wheelchair for the rest of his life.

7C This young man would not be able to raise his foot when he wanted to put on a shoe because . . .

1 impulses from receptors in his eyes would not be able to travel to his brain.

2 impulses from his brain would not be able to travel to his leg muscle.

3 chemicals would be released at synapses in the central nervous system.

4 reflex actions would not be able to happen in his legs.

7D The young man can sense some stimuli to his feet.

Which structures in his spinal cord were not damaged in the accident?

1 receptors

2 sensory neurones

3 motor neurones

4 effectors

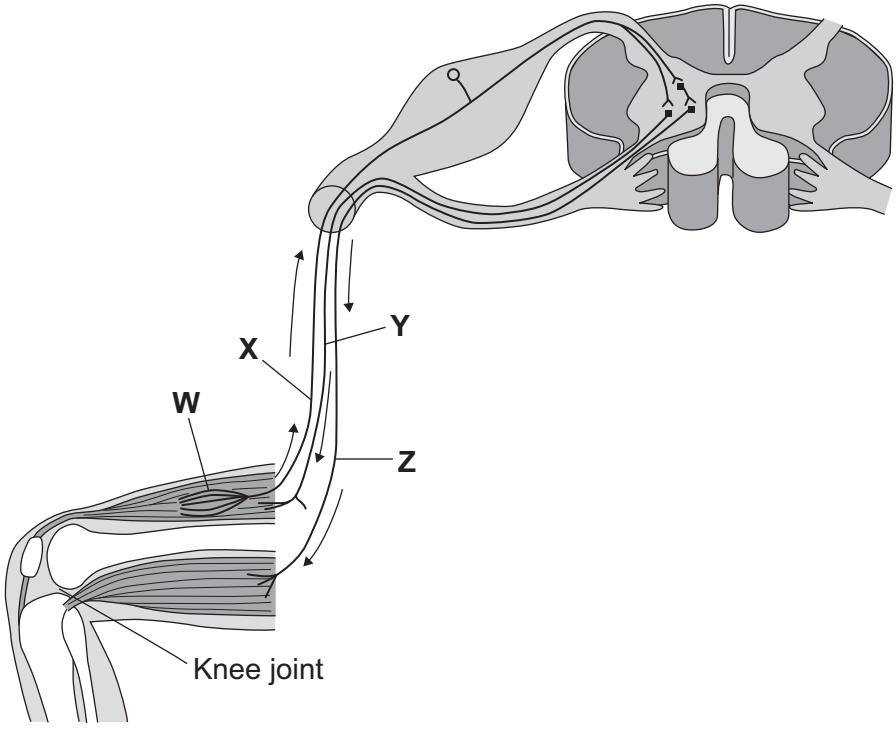
4.5.2.1 Structure and function

Question 16

November 2011 | BLY1AP | Original Q5 | Legacy

QUESTION FIVE

The diagram shows a reflex action involving muscles in the leg.



The arrows show the direction of nerve impulses.

5A Structure **W** detects stretch in the muscle.

Structure **W** is called . . .

1 an effector.

2 a receptor.

3 a sensory neurone.

4 a synapse.

5B Structure **X** is . . .

1 an effector.

2 a relay neurone.

3 a sensory neurone.

4 a synapse.

4.5.2.1 Structure and function

Question 16 · continued

The two muscles in the diagram are usually contracted to a small extent. Structures **Y** and **Z** are both motor neurones.

- Impulses from structure **Y** stimulate muscle contraction.
- Impulses from structure **Z** inhibit muscle contraction.

5C Which of the following is most likely to cause the leg to straighten at the knee joint?

1 impulses passing only along neurone **Y**

2 impulses passing only along neurone **Z**

3 impulses passing along both neurone **Y** and neurone **Z**

4 no impulses passing along neurones **Y** and **Z**

5D When the leg has straightened at the knee joint, . . .

1 impulses will move along **X** only.

2 impulses will move along **Y** only.

3 impulses will move along **X** and **Y** but not along **Z**.

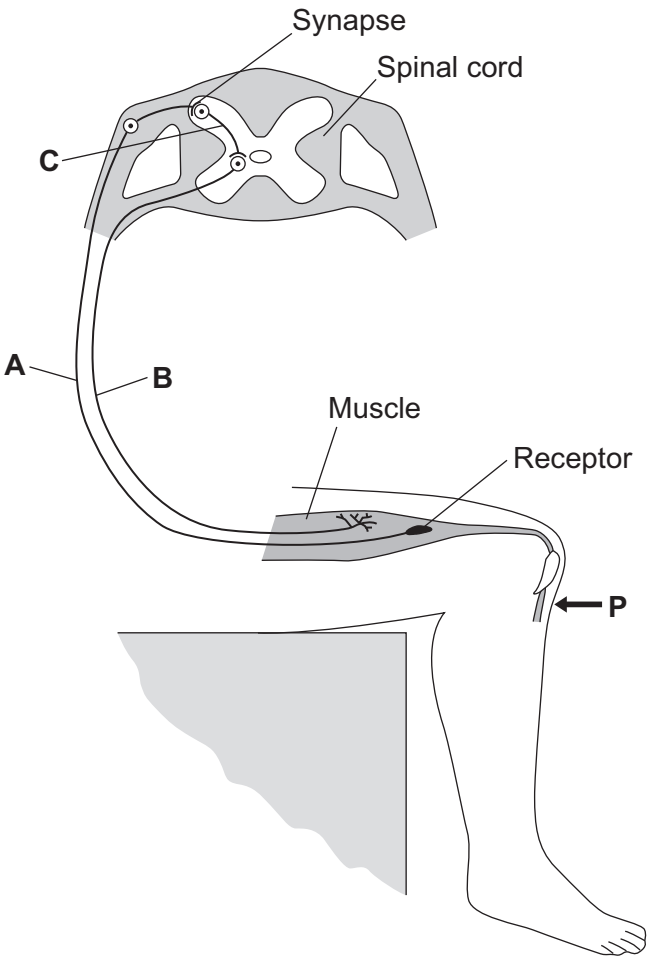
4 no impulses will move along **X** or **Y** or **Z**.

4.5.2.1 Structure and function

Question 17

January 2012 | BL1HP | Original Q7 | Legacy

7 The diagram shows the nervous pathway used to coordinate the knee-jerk reflex. When the person is hit at point **P**, the lower leg is suddenly raised.



7 (a) Name neurones **A**, **B** and **C**.

A .....

B .....

C .....

(3 marks)

7 (b) The receptor in the muscle in the leg is sensitive to a stimulus.

Suggest the stimulus.

.....

(1 mark)

4.5.2.1 Structure and function

Question 17 · continued

7 (c) Describe what happens at the synapse during this reflex.

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(3 marks)

7

Turn over for the next question

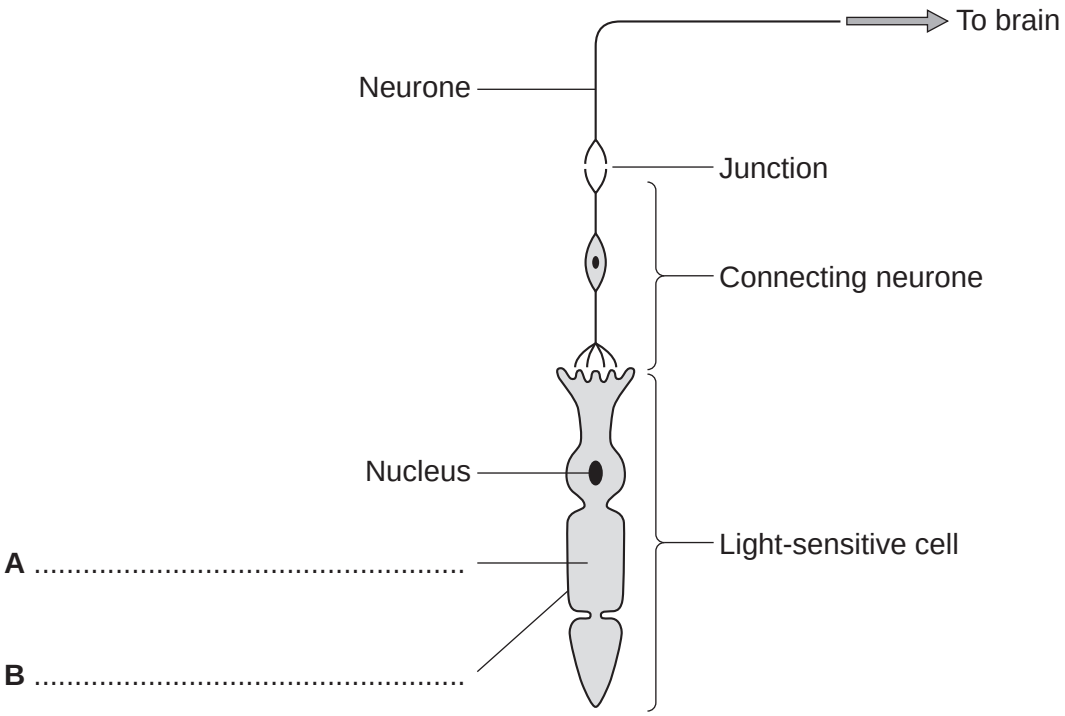
4.5.2.1 Structure and function

Question 18

June 2013 | BL1HP | Original Q7 | Legacy

7 **Diagram 1** shows cells from the light-sensitive layer in the eye.

Diagram 1



7 (a) On **Diagram 1**, add labels to name part **A** and part **B** of the light-sensitive cell.

(2 marks)

7 (b) There is a junction between the connecting neurone and the neurone carrying the impulse to the brain.

7 (b) (i) What name is given to the junction?

.....

(1 mark)

7 (b) (ii) In what form is information passed across the junction?

.....

.....

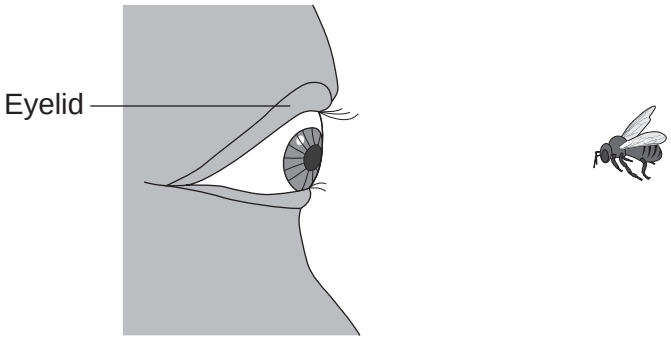
(1 mark)

4.5.2.1 Structure and function

Question 18 · continued

7 (c) **Diagram 2** shows a bee flying towards a man's eye.

Diagram 2



In the *blink reflex*, light from the bee reaches the light-sensitive cell in the eye. The muscles in the eyelid shut the man's eye before the bee hits the eye.

Describe the pathway taken by the nerve impulse in the *blink reflex*.

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(4 marks)

8

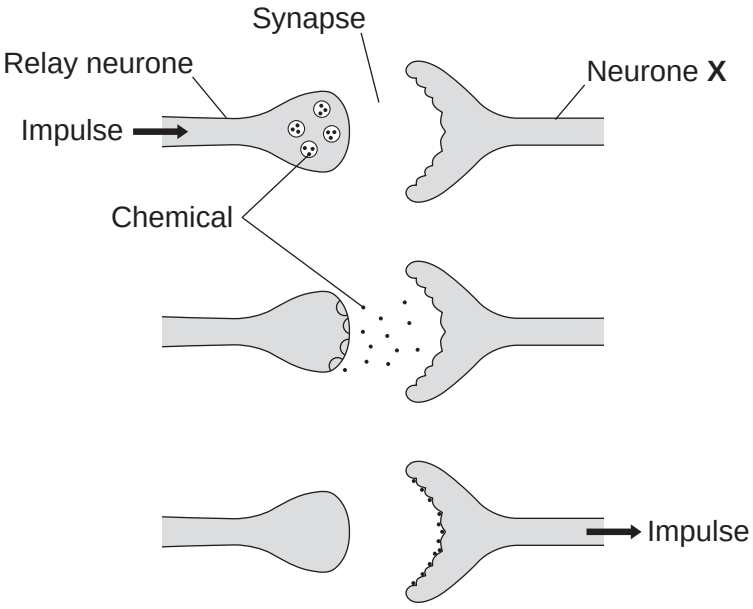
4.5.2.1 Structure and function

Question 19

June 2014 | BL1HP | Original Q5 | Legacy

5 **Figure 3** shows how a nerve impulse passing along a relay neurone causes an impulse to be sent along another type of neurone, neurone **X**.

Figure 3



5 (a) What type of neurone is neurone **X**?

[1 mark]

.....

5 (b) Describe how information passes from the relay neurone to neurone **X**.
Use **Figure 3** to help you.

[3 marks]

.....

.....

.....

.....

.....

.....

4.5.2.1 Structure and function

Question 19 · continued

5 (c) Scientists investigated the effect of two toxins on the way in which information passes across synapses. **Table 2** shows the results.

Table 2

Toxin	Effect at the synapse
Curare	Decreases the effect of the chemical on neurone **X**
Strychnine	Increases the amount of the chemical made in the relay neurone

Describe the effect of each of the toxins on the response by muscles.

[2 marks]

Curare .....

.....

.....

Strychnine .....

.....

.....

6

4.5.2.1 Structure and function

Question 20

June 2015 | BL1HP | Original Q7 | Legacy

7 This question is about the nervous system.

7 (a) Describe the function of receptors in the skin.

[2 marks]

.....

.....

.....

.....

7 (b) A response is caused when information in the nervous system reaches an effector.

7 (b) (i) There are two different types of effector.

Complete **Table 4** to show:

- the two different types of effector
- the response each type of effector makes.

[4 marks]

Table 4

Type of effector	Response the effector makes
1	....
2	....

7 (b) (ii) Some effectors help to control body temperature.

Give **one** reason why it is important to control body temperature.

[1 mark]

.....

.....

7

4.5.2.1 Structure and function

Question 21

June 2016 | BL1HP | Original Q4 | Legacy

4 This question is about the nervous system.

4 (a) Describe the difference between the function of a receptor and the function of an effector.

In your answer you should give **one** example of a receptor and **one** example of an effector.

[4 marks]

4 (b) Synapses are important in the nervous system.

4 (b) (i) What is a synapse?

[2 marks]

4 (b) (ii) Describe how information passes across a synapse.

[2 marks]

4.5.2.1 Structure and function

Question 21 · continued

4 (c) Reflexes may be co-ordinated by the brain or by the spinal cord.

4 (c) (i) The reflexes from sense organs in the head are co-ordinated by the brain.

Name a sense organ involved in a reflex co-ordinated by the spinal cord.

[1 mark]

_____

4 (c) (ii) **Table 1** shows information about reflexes co-ordinated by the brain and reflexes co-ordinated by the spinal cord.

Table 1

Organ co-ordinating the reflex	Mean length of neurones involved in cm	Mean time taken for reflex in milliseconds	Mean speed of impulse in cm per millisecond
Brain	12	4	3
Spinal cord	80	50	

Calculate the mean speed of the impulse for the reflex co-ordinated by the spinal cord.

[1 mark]

_____

_____

Mean speed = _____ cm per millisecond

4 (c) (iii) In reflexes co-ordinated by the brain there are **no** relay neurones.

Suggest why there is a difference in the mean speed of the impulse for the two reflexes.

[2 marks]

_____

_____

_____

_____

12

4.5.2.1 Structure and function

Question 22

June 2017 | BL1HP | Original Q3 | Legacy

3 The human body responds to changes in internal conditions and external conditions.

3 (a) The water and ion content of the body must be controlled.

Ions are lost from the body in different liquids from different organs.

3 (a) (i) Complete **Table 1** to show **two** ways ions are lost from the body.

[4 marks]

Table 1

Liquid	Organ
_____	_____
_____	_____

3 (a) (ii) How are the ions which are lost from the body replaced?

[1 mark]

_____

_____

Question 3 continues on the next page

4.5.2.1 Structure and function

Question 22 · continued

3 (b) **In this question you will be assessed on using good English, organising information clearly and using specialist terms where appropriate.**

Reflexes allow humans to respond to stimuli (changes in the environment).

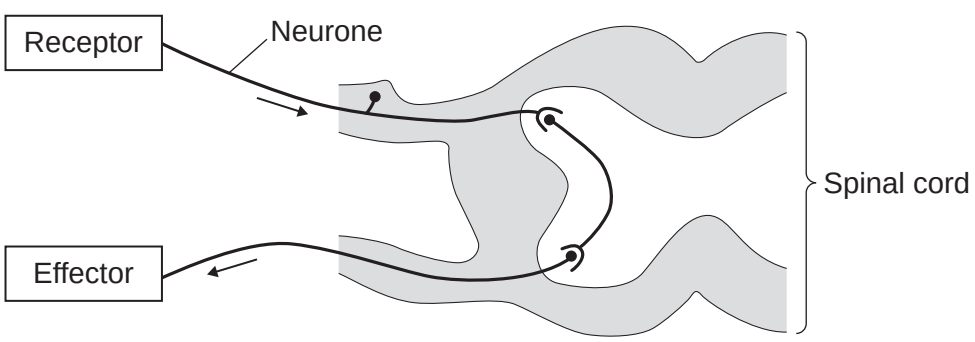
One example of a reflex is when a finger touches a hot kettle and the arm is pulled away.

Sense organs contain receptors that detect stimuli.

Effectors are muscles or glands which respond.

Figure 2 is a diagram of a simple reflex pathway.

Figure 2



Describe how a simple reflex works.

Your answer should include:

- one type of receptor and the stimulus that the receptor detects
- how information is passed from the receptor to the effector.

[6 marks]

4.5.2.1 Structure and function

Question 23

0 1 Many human actions are reflexes.

0 1 . 1 Which **two** of the following are examples of reflex actions?

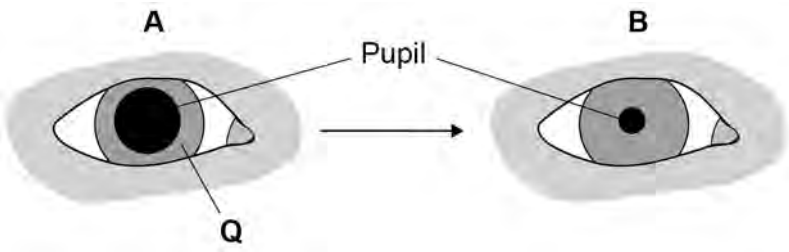
[2 marks]

Tick **two** boxes.

- Jumping in the air to catch a ball ☐
- Raising a hand to protect the eyes in bright light ☐
- Releasing saliva when food enters the mouth ☐
- Running away from danger ☐
- Withdrawing the hand from a sharp object ☐

Figure 1 shows how the size of the pupil of the human eye can change by reflex action.

Figure 1



0 1 . 2 Name **one** stimulus that would cause the pupil to change in size from **A** to **B**, as shown in **Figure 1**.

[1 mark]

_____

4.5.2.1 Structure and function

Question 23 · continued

0 1 . 3 Structure **Q** causes the change in size of the pupil.

Name structure **Q**.

[1 mark]

0 1 . 4 Describe how structure **Q** causes the change in the size of the pupil from **A** to **B**.

[1 mark]

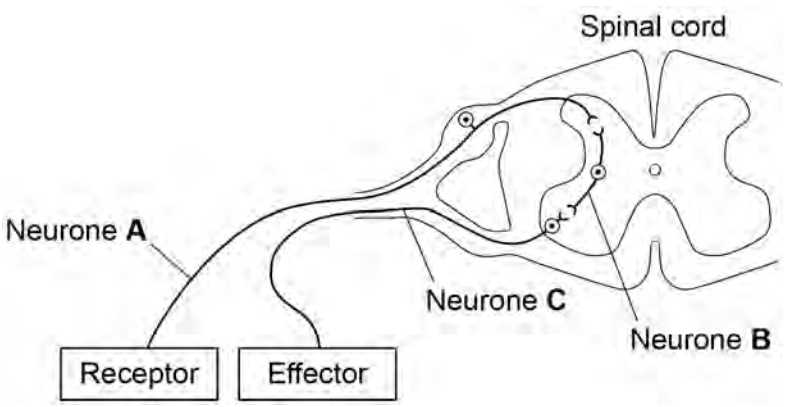
Question 1 continues on the next page

4.5.2.1 Structure and function

Question 23 · continued

0 1 . 5 **Figure 2** shows some structures involved in the coordination of a reflex action.

Figure 2



Describe how the structures shown in **Figure 2** help to coordinate a reflex action.

[6 marks]

11

4.5.2.1 Structure and function

Question 24

November 2021 | 8461/2H | Original Q6

0 6 Reflex actions are coordinated by the nervous system.

0 6 . 1 What is meant by the term 'reflex action'?

[2 marks]

0 6 . 2 A woman's hand accidentally touches a hot object.

The woman moves her hand away rapidly.

Describe how the woman's nervous system coordinates the reflex action.

[6 marks]

4.5.2.1 Structure and function

Question 24 · continued

0 6 . 3 The endocrine system coordinates many internal functions of the body.

Give **three** ways coordination by the endocrine system is different from coordination by the nervous system.

[3 marks]

1 _____

2 _____

3 _____

0 6 . 4 Describe how hormones control the menstrual cycle.

[5 marks]

16

4.5.2.1 Structure and function

Question 25

June 2023 | 8461/2H | Original Q2

0 2 A person's eyes can focus on objects at different distances.

A person looks at a distant object.

The person then looks at a near object.

The person's eyes make adjustments so that the near object forms a clear image.

0 2 . 1 Which term describes the adjustment of focus from the distant object to the near object?

[1 mark]

Tick (✓) **one** box.

Accommodation ☐

Adaptation ☐

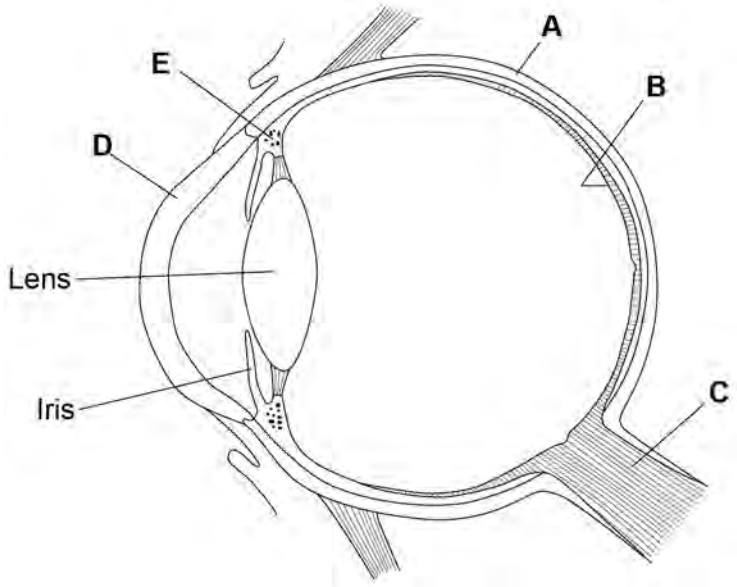
Hyperopia ☐

Myopia ☐

Figure 3 shows the eye.

Figure 3

.



Question 25 · continued

0 2 . 2 Which structure in **Figure 3** is where the image is focused?

[1 mark]

Tick (✓) **one** box.

A ☐ **B** ☐ **C** ☐ **D** ☐ **E** ☐

0 2 . 3 Which structure in **Figure 3** is a muscle that contracts when focusing on a near object?

[1 mark]

Tick (✓) **one** box.

A ☐ **B** ☐ **C** ☐ **D** ☐ **E** ☐

0 2 . 4 What happens to the shape of the lens when focusing on a near object?

[1 mark]

0 2 . 5 The eyes can function in dimly-lit areas and in brightly-lit areas.

The iris contains muscles.

Describe how muscles in the iris help the person to see clearly when moving from a dimly-lit area to a brightly-lit area.

[2 marks]

4.5.2.1 Structure and function

Question 25 · continued

0 2 . 6 It is important to be able to react quickly.

Many people think that drinking coffee decreases reaction time.

Plan an investigation to test the effect of drinking coffee on reaction time.

You should include:

- the test for reaction time that you would use
- how to make the investigation valid.

[4 marks]

10

4.5.2.1 Structure and function

Question 26

June 2024 | 8461/2H | Original Q5

0 5 The human body has two coordination systems:

- the nervous system
- the endocrine system.

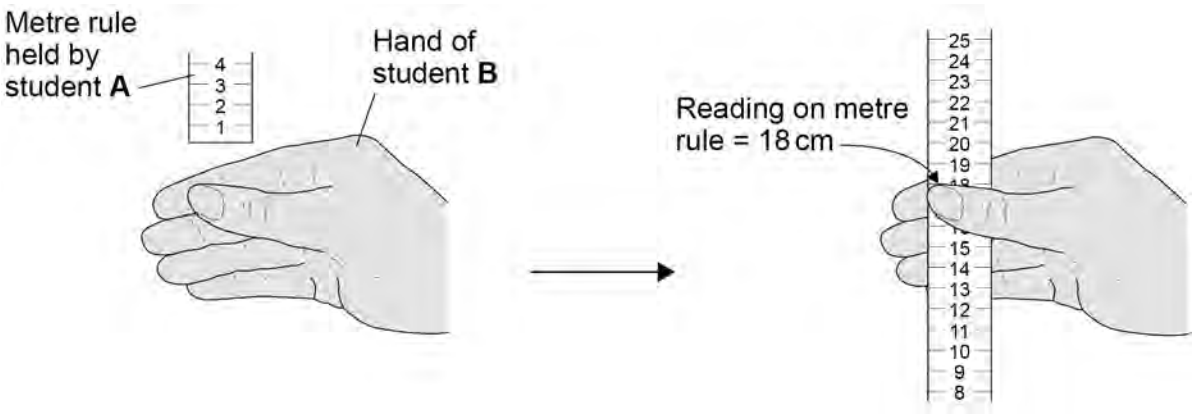
0 5 . 1 Two students investigated human reaction time.

Student **A** held a metre rule above student **B**'s hand.

Student **A** then released the metre rule and student **B** caught the rule as quickly as possible.

Figure 8 shows the method used.

Figure 8



Suggest **two** ways to improve the students' method for measuring human reaction time.

[2 marks]

1 _____

_____

2 _____

_____

4.5.2.1 Structure and function

Question 26 · continued

0 5 . 2 Student **B**'s reaction is coordinated by the nervous system.

Give **two** ways that coordination by the endocrine system is different from coordination by the nervous system.

[2 marks]

1 _____

_____

2 _____

_____

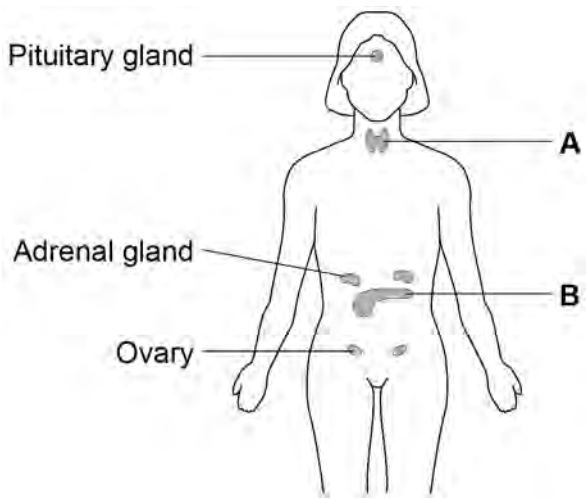
Question 5 continues on the next page

4.5.2.1 Structure and function

Question 26 · continued

Figure 9 shows endocrine glands in a female.

Figure 9



0 5 . 3 Name **one** hormone produced by gland **A**.

[1 mark]

_____

0 5 . 4 Name **one** hormone produced by gland **B**.

[1 mark]

_____

0 5 . 5 The adrenal gland produces the hormone adrenaline.

Describe **two** effects of adrenaline on the human body.

[2 marks]

1 _____

_____

2 _____

_____

4.5.2.1 Structure and function

Question 26 · continued

0 5 . 6 Hormones can be used for controlling human reproduction.

Explain the use of hormones in:

- contraception
- the treatment of infertility.

[6 marks]

14

4.5.2.1 Structure and function

Question 27

0 7 Two students investigated reaction time.

This is the method used.

1. Student **A** holds a metre rule just above student **B**'s hand, as shown in **Figure 7**.
2. Student **A** lets go of the metre rule.
3. Student **B** catches the metre rule as quickly as possible.
4. Student **A** writes down the reading from the scale on the metre rule.
5. Students **A** and **B** repeat steps 1 to 4 another six times.

Figure 7

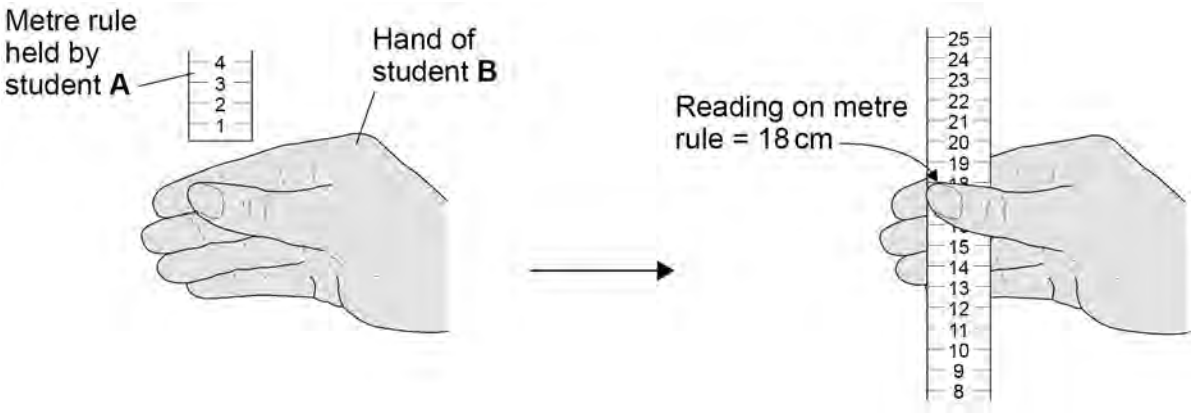


Table 3 shows the results.

Table 3

Test	Reading on metre rule in cm
1	18
2	15
3	12
4	16
5	14
6	23
7	14
Mean	16

4.5.2.1 Structure and function

Question 27 · continued

0 7 . 1 What is the median result in **Table 3**?

[1 mark]

Tick (✓) **one** box.

14 cm ☐ 15 cm ☐ 16 cm ☐ 18 cm ☐

0 7 . 2 Calculate student **B**'s mean reaction time.

Use the equation:

$$t = \sqrt{\frac{2d}{980}}$$

d = mean distance in cm
t = mean reaction time in s

Give your answer in milliseconds.

Give your answer to 3 significant figures.

Use data from **Table 3**.

[4 marks]

Mean reaction time (3 significant figures) = _____ milliseconds

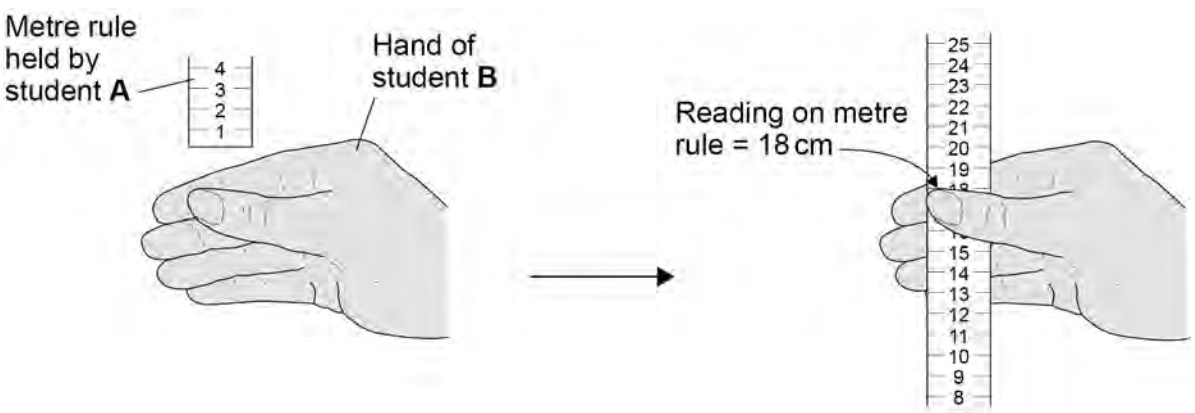
Question 7 continues on the next page

Question 27 · continued

The method and **Figure 7** are repeated below.

1. Student **A** holds a metre rule just above student **B**'s hand, as shown in **Figure 7**.
2. Student **A** lets go of the metre rule.
3. Student **B** catches the metre rule as quickly as possible.
4. Student **A** writes down the reading from the scale on the metre rule.
5. Students **A** and **B** repeat steps 1 to 4 another six times.

Figure 7



0 7 . 3 Describe **two** ways the students could improve the investigation.

Do **not** refer to repeating results in your answer.

[2 marks]

1 _____

_____

2 _____

_____

4.5.2.1 Structure and function

Question 27 · continued

0 7 . 4 Catching the rule was a response to a stimulus.

Describe how student **B**'s response was coordinated by the nervous system.

[6 marks]

Extra space

13