AQA GCSE Biology | 8461

SPECIFICATION POINT 4.5.2.1

Structure and function

Past-paper questions

Tier	**Foundation**
Question groups	**35**
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

January 2007 | BLY1F | Original Q2 | Legacy

2 List **A** gives the names of four drugs which affect the body.

List **B** gives information about substances which affect the body.

Draw a straight line from each drug in List **A** to its information in List **B**.

List A **Drugs**	**List B** **Information**
Alcohol	The addictive substance in tobacco smoke
Cocaine	Deprives a fetus of oxygen, leading to low birth mass
Nicotine	A very addictive drug, sold illegally in the UK
Thalidomide	Drug which caused many children to be born with abnormal limbs
	Affects the nervous system by slowing down reactions

(4 marks)

4

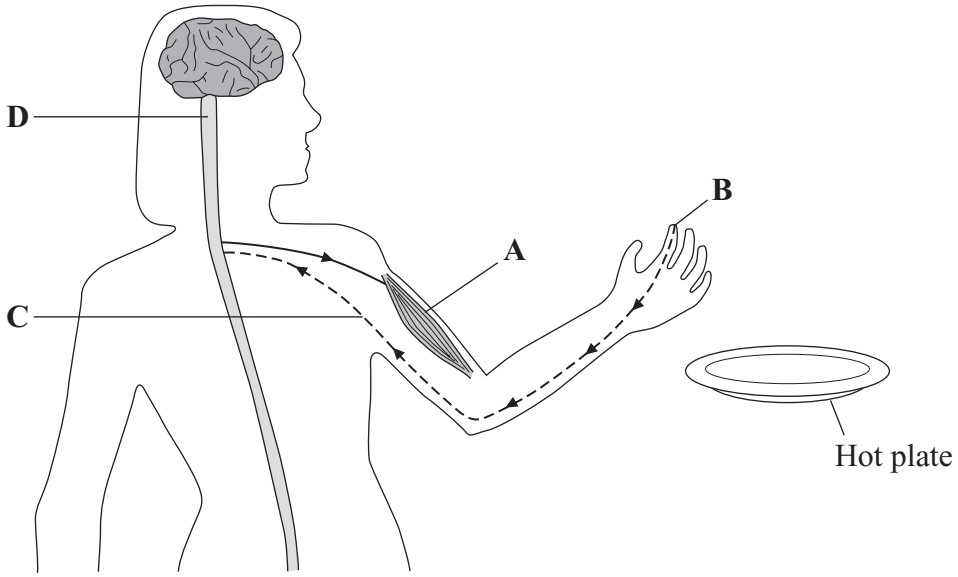
4.5.2.1 Structure and function

Question 02

January 2007 | BLY1F | Original Q3 | Legacy

3 A girl picks up a hot plate. A reflex action causes her to drop it.

The diagram shows some of the structures involved in this reflex action.



Use words from the box to name the structures labelled **A**, **B**, **C** and **D**.

brain	**gland**	**muscle**	**neurone**	**receptor**	**spinal cord**

A .....

B .....

C .....

D .....

(4 marks)

4

4.5.2.1 Structure and function

Question 03

March 2007 | BLY1A | Original Q3 | Legacy

QUESTION THREE

The table shows some of the reflexes in a very young baby.

Reflex	Stimulus	Baby's response
A	flash of light	baby closes eyes
B	palm of hand touched	baby makes a tight fist
C	cheek stroked	baby turns towards stimulus
D	mouth touched by mother's finger	baby starts to suck

The reflexes help the baby to survive.

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

	How the reflex helps the baby to survive
1	helps the baby to feed on milk
2	helps the baby to find a nipple when feeding
3	helps the baby to hold onto mother
4	protection

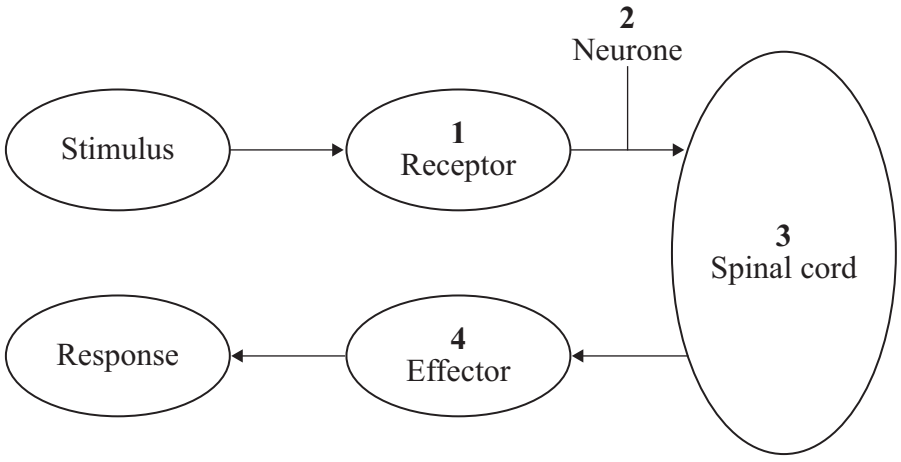
4.5.2.1 Structure and function

Question 04

June 2007 | BLY1A | Original Q3 | Legacy

QUESTION THREE

The diagram shows some of the parts involved in a reflex action.



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

A brings about a change in the body

B carries nerve impulse

C coordinates a response

D detects changes

4.5.2.1 Structure and function

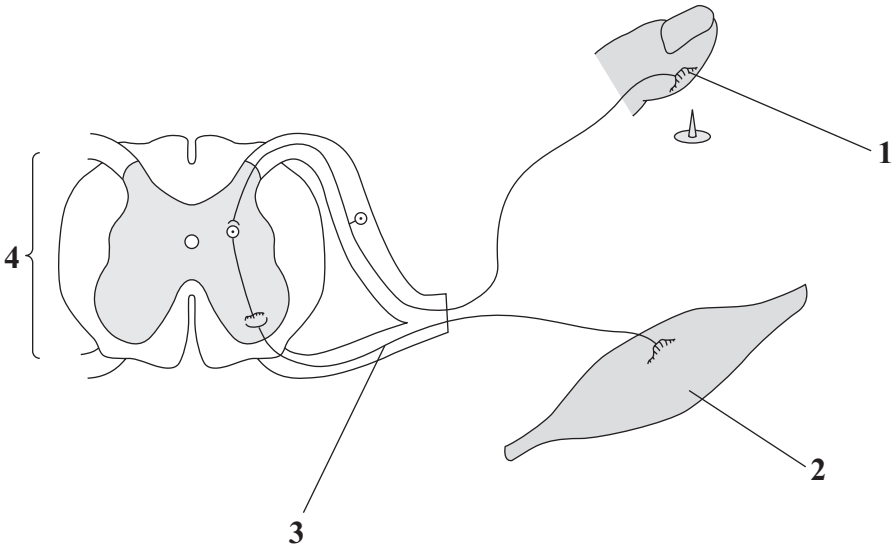
Question 05

November 2007 | BLY1A | Original Q5 | Legacy

QUESTION FIVE

A person puts their finger on a pin. A reflex action causes them to pull their hand away quickly.

The diagram shows the structures involved in this reflex action.



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

A muscle

B neurone

C pain receptor

D spinal cord

4.5.2.1 Structure and function

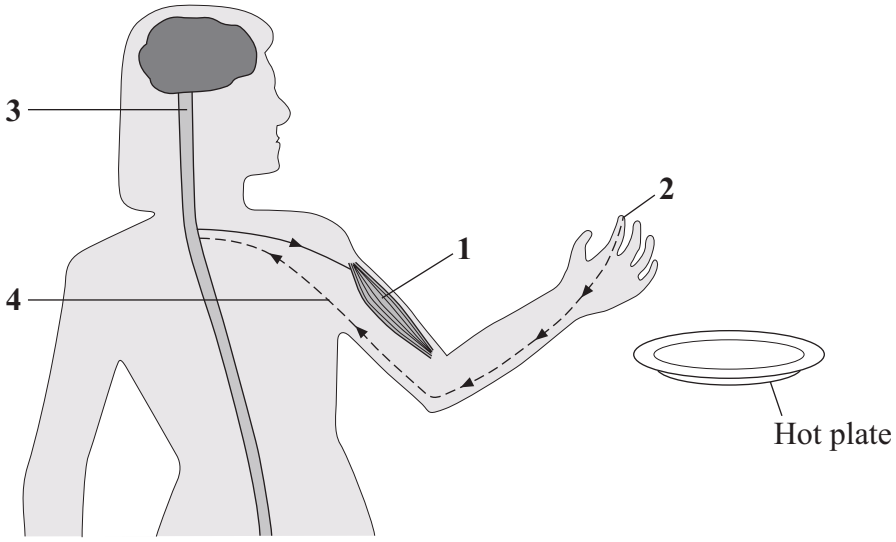
Question 06

March 2008 | BLY1AP | Original Q4 | Legacy

QUESTION FOUR

When we touch something hot, we quickly pull our hand away.

The diagram shows some of the structures involved in this reflex action.



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

A muscle

B neurone

C central nervous system

D receptor

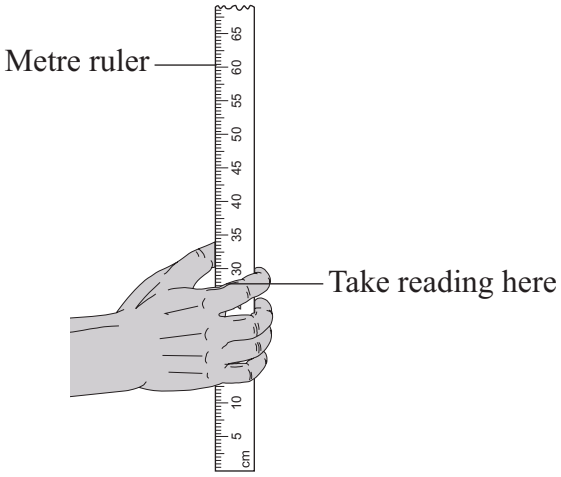
4.5.2.1 Structure and function

Question 07

March 2008 | BLY1AP | Original Q7 | Legacy

QUESTION SEVEN

A class compared reaction times in people of different age and sex. They tested 5 people in each category. A ruler was dropped between the fingers of each person. The person would catch it as quickly as possible once they saw it being dropped. A reading was taken from the ruler at the point where it was caught. The greater the distance the ruler fell the slower the reaction time.



The results are shown in the table below.

Age in years	Average point at which ruler was caught in cm	
	Males	Females
10	23	23
15	20	19
20	18	18
30	20	25
40	24	26

4.5.2.1 Structure and function

Question 07 · continued

7A The average point at which the ruler was caught by a 30 year old male was . . .

1 18 cm.

2 20 cm.

3 24 cm.

4 25 cm.

7B Based on the results of the experiment, which of the following is correct?

1 At all ages, females have faster reaction times than males.

2 At all ages, females have slower reaction times than males.

3 Females aged 50 and 60 have slower reaction times than males of the same age.

4 Between 10 and 20 years of age, the reaction time of males and females is the same.

7C One way in which the reliability of the results in this experiment could be improved would be to . . .

1 test more males and females in each age group.

2 test males and females who are older than 60 and younger than 10.

3 use a ruler which measures in inches rather than centimetres.

4 use a 50 cm ruler.

7D Which receptors detect that the ruler has been dropped?

1 light

2 sound

3 temperature

4 touch

4.5.2.1 Structure and function

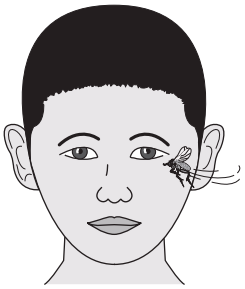
Question 08

June 2008 | BLY1AP | Original Q4 | Legacy

QUESTION FOUR

This question is about reflex actions.

An insect flies near to the eyes of a boy.



The boy blinks his eyes very quickly.

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

A blinking

B cells in the eye

C insect

D muscle in the eyelid

1	effector
2	response
3	stimulus
4	receptor

4.5.2.1 Structure and function

Question 09

January 2009 | BLY1F | Original Q1 | Legacy

1 The photograph shows a child waiting to cross a road.



© Owen Franken/Corbis

1 (a) Name **two** different sense organs she would use to detect when it is safe to cross the road.

1 .....

2 .....

(2 marks)

1 (b) Which sense organ contains receptors that help the child to keep her balance?

.....

(1 mark)

1 (c) (i) Complete the sentence.

A car driver automatically brakes if a child dashes out into the road.

This is called a ..... action.

(1 mark)

1 (c) (ii) Draw a ring around the correct answer to complete the sentence.

In the nervous system, information passes along cells called

effectors
neurones
synapses

.

(1 mark)

5

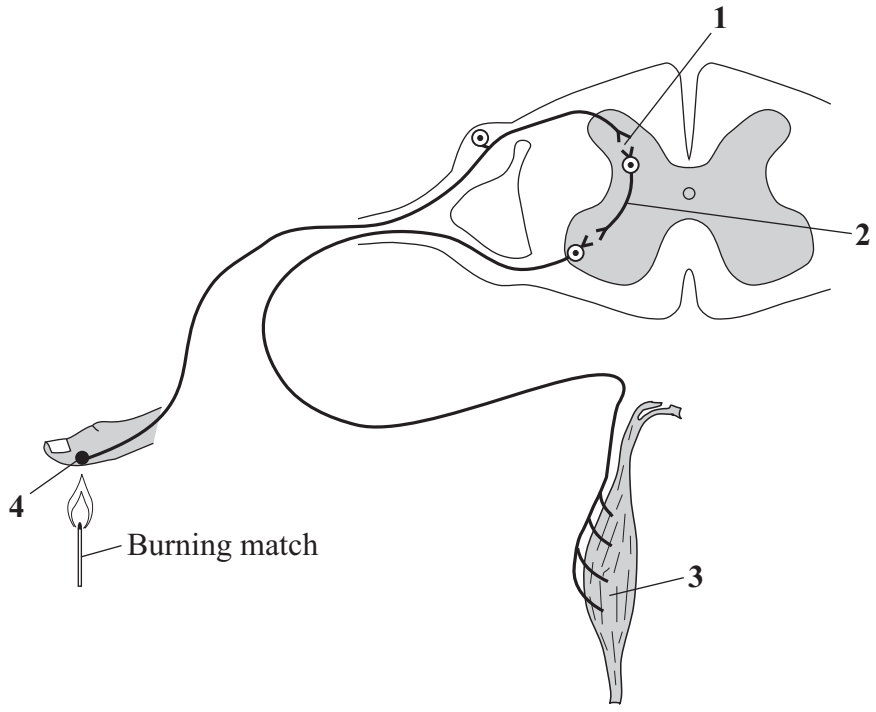
4.5.2.1 Structure and function

Question 10

March 2009 | BLY1AP | Original Q5 | Legacy

QUESTION FIVE

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 11

June 2009 | BLY1AP | Original Q2 | Legacy

QUESTION TWO

The picture shows a girl cooking some pasta sauce.



Match statements, **A**, **B**, **C** and **D**, with organs **1–4** in the table.

A has receptors that are sensitive to the smell of the pasta sauce

B has receptors that would detect heat if the girl touched the pan

C has receptors that are sensitive to the taste of the pasta sauce

D has receptors that enable the girl to read the recipe for the pasta sauce

1	eye
2	nose
3	skin
4	tongue

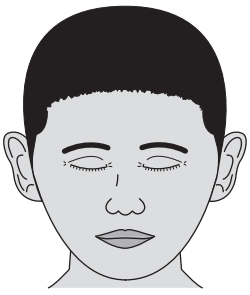
4.5.2.1 Structure and function

Question 12

June 2009 | BLY1AP | Original Q5 | Legacy

QUESTION FIVE

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** . . . .

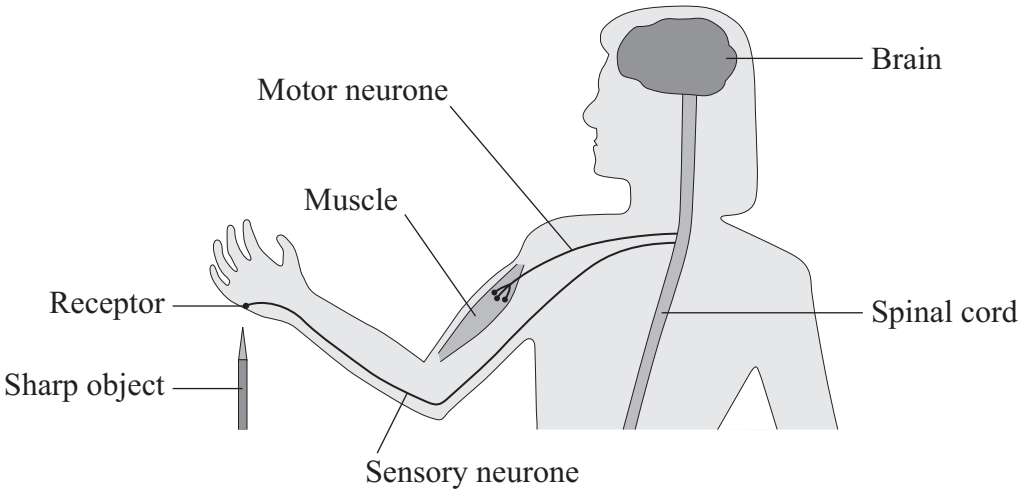
The blink is caused by the contraction of a . . . **4** . . . in the eyelid.

4.5.2.1 Structure and function

Question 13

June 2009 | BLY1F | Original Q3 | Legacy

3 A student accidentally touches a sharp object.
Her hand is immediately pulled away from the object.
The diagram shows the structures involved in this response.



3 (a) Use the correct word or phrase **from the diagram** to complete each sentence.

3 (a) (i) The stimulus is detected by the .....

(1 mark)

3 (a) (ii) Impulses travel to the central nervous system along a

cell called a .....

(1 mark)

3 (a) (iii) Impulses travel from the central nervous system to the effector

along a cell called a .....

(1 mark)

3 (a) (iv) The hand is pulled away from the sharp object by the

.....

(1 mark)

4.5.2.1 Structure and function

Question 13 · continued

for mark

3 (b) Where in the body are there cells sensitive to:

3 (b) (i) light .....

(1 mark)

3 (b) (ii) sound .....

(1 mark)

3 (b) (iii) changes in position?.....

(1 mark)

7

Turn over for the next question

4.5.2.1 Structure and function

Question 14

November 2009 | BLY1AP | Original Q1 | Legacy

QUESTION ONE

Dust in the air made this boy sneeze.



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

A dust

B muscles

C nose

D sneeze

In this reflex action, the stimulus is the . . . **1** . . . .

The receptors are found in the . . . **2** . . . .

The response is the . . . **3** . . . .

The response is brought about by the . . . **4** . . . .

4.5.2.1 Structure and function

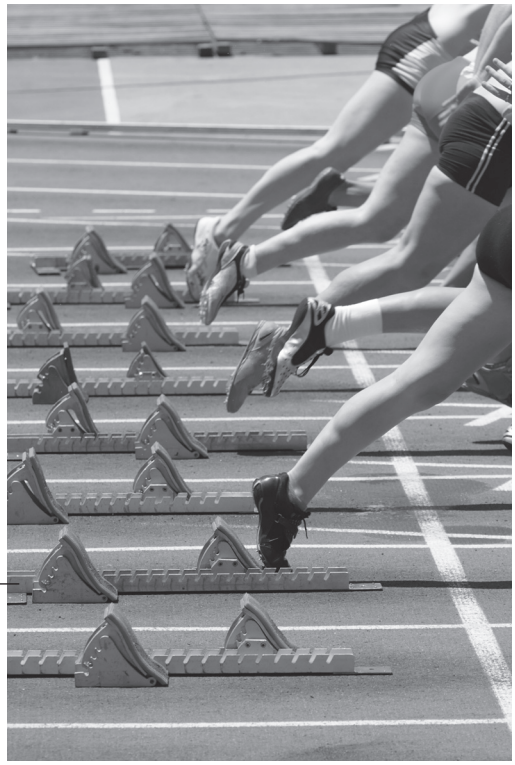
Question 15

March 2010 | BLY1AP | Original Q6 | Legacy

QUESTION SIX

A sports teacher wanted to find out which student had the quickest reaction time at the start of a 100 m race.

A starting pistol was fired from behind the start line and each student's reaction time was measured.



6A The stimulus to start running is . . .

1 heat.

2 light.

3 smell.

4 sound.

4.5.2.1 Structure and function

Question 15 · continued

6B The reaction time is the time from when the pistol was fired to when the student . . .

1 left the starting block.

2 reached the end of the race.

3 had taken one complete stride.

4 heard the sound made by the pistol.

6C The gun was fired behind the students so that they would . . .

1 not anticipate the gun firing.

2 hear the gun firing better.

3 not be frightened by the gun being fired.

4 have a clear track to run on.

6D The student who left the blocks first would be the one with . . .

1 the longest reaction time.

2 the shortest reaction time.

3 the greatest range of reaction times.

4 the smallest range of reaction times.

4.5.2.1 Structure and function

Question 16

June 2010 | BLY1AP | Original Q3 | Legacy

QUESTION THREE

The human body responds to changes in the environment.

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

A muscles

B stimuli

C receptors

D neurones

Changes in the environment that the body detects are called . . . **1** . . . .

Changes in the environment are detected by special cells called . . . **2** . . . .

Electrical impulses are then sent along . . . **3** . . . .

The response is often brought about by . . . **4** . . . .

4.5.2.1 Structure and function

Question 17

June 2010 | BLY1AP | Original Q7 | Legacy

QUESTION SEVEN

A class of students investigated the reaction time of a student.

- The students used a computer program to measure reaction time.
- A student was told to press the space bar when the screen colour changed to yellow.
- The computer program measured the time it took for the student to press the space bar after the screen colour changed to yellow.
- The starting screen colour was changed in each test.
- The end screen colour was always yellow.

7A The receptors that detect the colour change on the screen are found in the . . .

1 finger.

2 eye.

3 brain.

4 ear.

7B The independent variable in this experiment was the . . .

1 starting colour.

2 end colour.

3 time taken to press the space bar.

4 gender of the student.

4.5.2.1 Structure and function

Question 17 · continued

7C The table shows the results for the student.

Starting colour	End colour	Time taken to press the space bar in seconds
Red	Yellow	0.07
Blue	Yellow	0.04
Green	Yellow	0.06
Black	Yellow	0.05

To which colour change did the student react the fastest?

1 red to yellow

2 blue to yellow

3 green to yellow

4 black to yellow

7D How could this investigation be made more reliable?

1 decrease the number of starting colours

2 increase the number of end colours

3 increase the number of times the student did the test

4 decrease the size of the computer screen

4.5.2.1 Structure and function

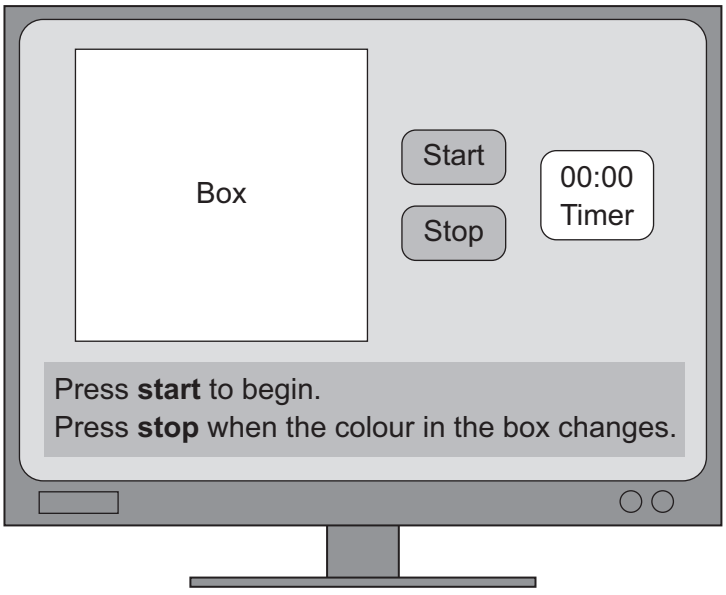
Question 18

March 2011 | BLY1AP | Original Q2 | Legacy

QUESTION TWO

A computer is used to measure a person's reaction time.

The diagram shows the computer screen.



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

A an effector

B a receptor

C a response

D a stimulus

The change in colour of the box is . . . **1** . . . .

The change in colour of the box is detected by . . . **2** . . . .

Pressing **stop** is . . . **3** . . . .

The muscle used to press **stop** is . . . **4** . . . .

4.5.2.1 Structure and function

Question 19

March 2011 | BLY1AP | Original Q7 | Legacy

QUESTION SEVEN

Read this account of a students investigation.

I first tested three drinks, **X**, **Y** and **water**, on two friends, Pete and Raj, to find out which drink was best to use when jogging.

- I tested their reactions using a reaction timer.
- They jogged for 30 minutes, during which they drank 1 dm^3 of drink **X**.
- I then tested their reactions again in the same way.

After they had rested, they did the complete test again:

- with drink **Y**
- then with **water**
- then with **no drink**.

7A How could the student have improved his investigation?

1 by getting the two friends to jog for 1 hour

2 by testing ten friends

3 by using five different drinks

4 by asking the two friends to drink 2 dm^3 of each drink

The student's results are shown in the table.

	Reaction time in seconds				
	Before jogging	**Drink X**	**Drink Y**	**Water**	**No drink**
Pete	1.2	1.3	0.9	1.3	1.6
Raj	1.4	1.5	1.1	1.4	1.7

7B For drink **X**, what is the difference between the reaction times before jogging and after jogging?

1 0.1 seconds

2 0.2 seconds

3 0.3 seconds

4 0.4 seconds

4.5.2.1 Structure and function

7C Using these results, which is the best advice for people running in a competitive race?

1 do not drink at all

2 use drink **X**

3 use drink **Y**

4 drink only **water**

7D Sports drinks should contain ions to replace those lost mainly by . . .

1 breathing.

2 eating.

3 sweating.

4 urinating.

Turn over for the next question

4.5.2.1 Structure and function

Question 20

June 2011 | BLY1F | Original Q4 | Legacy

4 The photograph shows a new-born baby.



4 (a) New-born babies have reflex actions. The reflex actions help new-born babies to survive.

Draw a line from each reflex action to the way in which it helps the baby to survive.

Reflex action	How the reflex action helps the baby
If milk goes down the baby's windpipe the baby coughs.	Helps the baby to hold on to the mother
If the mother touches the palm of the baby's hand, the baby clenches its fist.	Prevents the baby from choking
If the mother strokes the baby's mouth, the baby begins to suck.	Helps to protect some of the baby's receptors
If a bright light shines on the baby, the baby's eyes shut.	Helps the baby to crawl
	Helps the baby to feed

(4 marks)

4.5.2.1 Structure and function

Question 20 · continued

4 (b) Which **two** of the following may be effectors in reflex actions?

Tick (✓) **two** boxes.

- Brain ☐
- Glands ☐
- Motor neurones ☐
- Muscles ☐
- Sensory neurones ☐

(2 marks)

6

4.5.2.1 Structure and function

Question 21

November 2011 | BLY1AP | Original Q6 | Legacy

QUESTION SIX

A student was walking home after a night out with a group of friends. He stepped out into the road in front of a car. The car brakes made a screeching noise as the car tried to stop. Luckily, the student jumped back onto the pavement without thinking as soon as he was aware of the danger.



6A Which row in the table shows the sense organs that could have detected the car?

	Skin	Eyes	Nose	Tongue	Ears
1	✓	✓			
2		✓	✓	✓	
3	✓			✓	
4		✓			✓

6B The cells that detect changes in the surroundings are called . . .

1 muscles.

2 receptors.

3 stimuli.

4 synapses.

4.5.2.1 Structure and function

Question 21 · continued

6C Jumping back onto the pavement involved a reflex action.

All reflex actions . . .

1 involve the brain.

2 are rapid and automatic.

3 involve glands.

4 involve hormones.

6D The student's reaction time would have been slower if . . .

1 he had smoked a cigarette earlier.

2 the car had been travelling faster.

3 he had been drinking alcohol.

4 the driver had sounded his horn.

Turn over for the next question

4.5.2.1 Structure and function

Question 22

January 2012 | BL1FP | Original Q6 | Legacy

6 Nicotine is a drug in tobacco smoke. Smoking tobacco is harmful.

6 (a) (i) Many smokers find it difficult to stop smoking.

Complete the sentence.

It is difficult to stop smoking because nicotine is very ..... .

(1 mark)

6 (a) (ii) Nicotine affects synapses in the brain.

What is a synapse?

.....

.....

(1 mark)

6 (b) A drug company has developed a new drug, Drug **A**, to help people stop smoking.

Doctors tested the drug in a double-blind trial with over 2000 volunteers who were smokers.

The volunteers wanted to stop smoking.

The volunteers were divided into three groups. Each volunteer took a tablet once a day for 12 weeks:

- group 1 took Drug **A**
- group 2 took Drug **B** (a drug already in use to stop people smoking)
- group 3 took a placebo.

The smoking habits of each group were recorded for a year.

6 (b) (i) What is a placebo?

.....

(1 mark)

6 (b) (ii) Why is a placebo group used in drug trials?

.....

.....

(1 mark)

4.5.2.1 Structure and function

Question 22 · continued

6 (b) (iii) Which people knew what was in each tablet, in this trial?

Tick (✓) **one** box.

Both doctors and volunteers ☐

Doctors but not volunteers ☐

Neither doctors nor volunteers ☐

(1 mark)

6 (b) (iv) It is important that the three groups of volunteers should be similar.

Give **two** factors that should be similar in the groups of volunteers.

1 .....

2 .....

(2 marks)

6 (c) The table shows the results of the trials.

Tablet	Percentage of volunteers who had stopped smoking	
	After 12 weeks	After 1 year
Drug **A**	44	23
Drug **B**	30	15
Placebo	18	10

A doctor looked at the results of the tests.

The doctor suggested that a smoker who wanted to give up smoking should use Drug **A**.

Why?

.....

.....

(1 mark)

8

4.5.2.1 Structure and function

Question 23

June 2012 | BL1FP | Original Q1 | Legacy

1 The nervous system allows humans to react to their surroundings.

1 (a) Sense organs have receptors. Receptors detect *changes in the environment*.

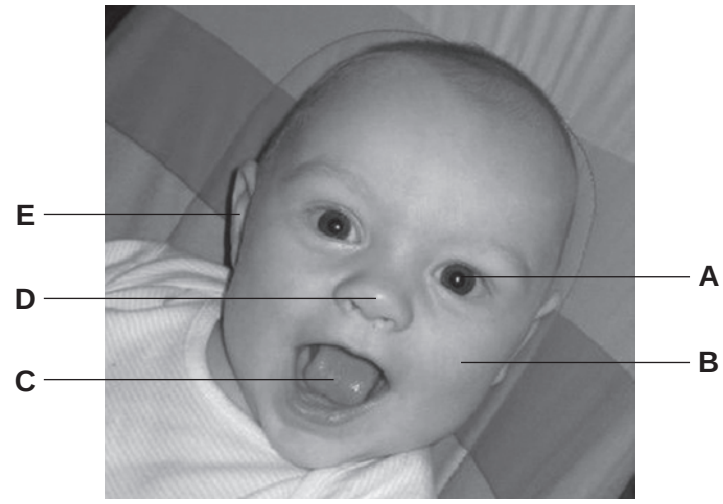
Which word describes *a change in the environment*?

Draw a ring around **one** answer.

an effector **a neurone** **a stimulus**

(1 mark)

1 (b) The photograph shows a baby.
Labels **A**, **B**, **C**, **D** and **E** show some of the baby's sense organs.



Answer each question by writing **one** letter, **A**, **B**, **C**, **D** or **E**, in each box.

1 (b) (i) Which sense organ has receptors sensitive to light? ☐

(1 mark)

1 (b) (ii) Which **two** sense organs have receptors sensitive to chemicals?

☐ and ☐

(2 marks)

1 (b) (iii) Which sense organ has receptors sensitive to changes in the baby's position? ☐

(1 mark)

4.5.2.1 Structure and function

Question 23 · continued

1 (c) Information from sense organ **A** is passed along nerve cells.
The information is coordinated to produce a response.

Which organ in the body coordinates the information?

.....

(1 mark)

6

Turn over for the next question

4.5.2.1 Structure and function

Question 24

June 2013 | BL1FP | Original Q6 | Legacy

6 The photographs show two breeds of cow.

Friesian cow



Jersey cow



In parts **(a)** and **(b)** draw a ring around the correct answer to complete each sentence.

6 (a) Cows produce their young (calves) by

asexual reproduction.
cloning.
sexual reproduction.

(1 mark)

6 (b) Cows and their calves have many similar characteristics.

6 (b) (i) The information for characteristics is carried by

clones.
embryos.
genes.

(1 mark)

6 (b) (ii) The information for characteristics is passed to the next generation in cells

called

body cells.
gametes.
neurones.

(1 mark)

4.5.2.1 Structure and function

Question 24 · continued

June 2013 | BL1FP | Original Q6 | Legacy

6 (c) Friesian and Jersey cows can both be used for meat or to produce milk.

The information shows features of Friesian and Jersey cows.

Friesian cows	Jersey cows
Body mass up to 600 kg	Body mass up to 400 kg
Milk contains 3.4% protein	Milk contains 3.8% protein
Can be milked for 325 days after giving birth	Can be milked for 250 days after giving birth
Produce no milk for 55 days before having a calf	Produce no milk for 45 days before having a calf
Produce > 30 litres of milk per day	Produce < 30 litres of milk per day

Use **only** the information above to answer these questions.

In your answers you must make comparisons between the two breeds of cow.

6 (c) (i) Give **two** advantages of a farmer keeping Friesian cows and **not** Jersey cows.

1 .....

.....

2 .....

.....

(2 marks)

6 (c) (ii) Give **two** advantages of a farmer keeping Jersey cows and **not** Friesian cows.

1 .....

.....

2 .....

.....

(2 marks)

Question 6 continues on the next page

4.5.2.1 Structure and function

Question 24 · continued

6 (d) Cow's milk is different from human milk. Cow's milk should **not** be given to young human babies.

Scientists in China have *genetically engineered* cows to produce human milk. Milk from these cows can be fed to young human babies.

6 (d) (i) What is *genetic engineering*?

Tick (✓) **one** box.

Genes from one organism are transferred to a different organism ☐

Cells are separated from an embryo and are transferred to host mothers ☐

The nucleus from a body cell is transferred to an egg cell ☐

(1 mark)

6 (d) (ii) Some people are worried about using milk from genetically engineered cows, to feed human babies.

Give **one** reason why.

.....

.....

(1 mark)

9

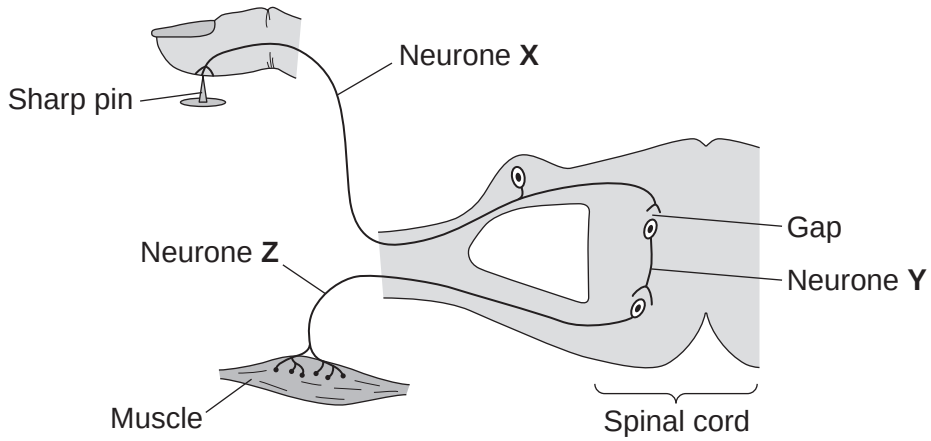
4.5.2.1 Structure and function

Question 25

June 2014 | BL1FP | Original Q7 | Legacy

7 **Figure 8** shows the pathway for a simple reflex action.

Figure 8



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

Draw a ring around the correct answer.

[1 mark]

motor neurone **relay neurone** **sensory neurone**

7 (b) There is a gap between neurone **X** and neurone **Y**.

7 (b) (i) What word is used to describe a gap between two neurones?

Draw a ring around the correct answer.

[1 mark]

effector **receptor** **synapse**

7 (b) (ii) Draw a ring around the correct answer to complete the sentence.

[1 mark]

Information passes across the gap as

- a chemical.
- an electrical impulse.
- pressure.

4.5.2.1 Structure and function

Question 25 · continued

7 (c) Describe what happens to the muscle when it receives an impulse from neurone **Z**.
How does this reflex action help the body?

[2 marks]

What happens to the muscle .....

.....

How this helps the body .....

.....

5

Turn over for the next question

4.5.2.1 Structure and function

Question 26

June 2015 | BL1FP | Original Q1 | Legacy

1 Humans use the nervous system to react to changes in the environment.

1 (a) (i) Which word means a change in the environment?

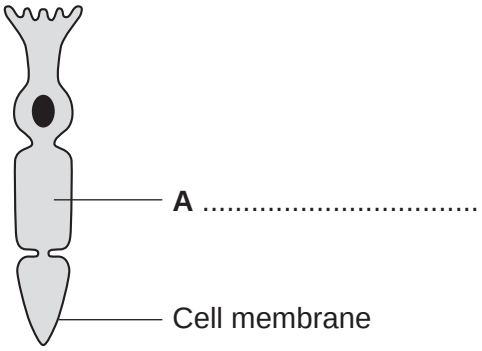
Draw a ring around the correct answer.

[1 mark]

neurone **reflex** **stimulus**

1 (a) (ii) **Figure 1** shows a light receptor cell.

Figure 1



Use the correct answer from the box to label part **A** on **Figure 1**.

[1 mark]

chloroplast	**cytoplasm**	**vacuole**

1 (b) **Figure 2** shows a boy riding a bicycle on a sunny day.

Figure 2



4.5.2.1 Structure and function

Question 26 · continued

1 (b) (i) Receptors in the boy's body detect changes in the environment.

Complete **Table 1** to show which organ of the body contains the receptors for each change in the environment.

[3 marks]

Table 1

Change in the environment	Organ that contains the receptors
Sound of traffic from behind him	
Flashing blue lights of a police car	
Cooler air temperature in the shadows	

1 (b) (ii) The boy's response to danger is to pull on the bicycle brakes.

Which type of effector causes this response?

Tick (✓) **one** box.

[1 mark]

A gland ☐

A muscle ☐

A synapse ☐

6

4.5.2.1 Structure and function

Question 27

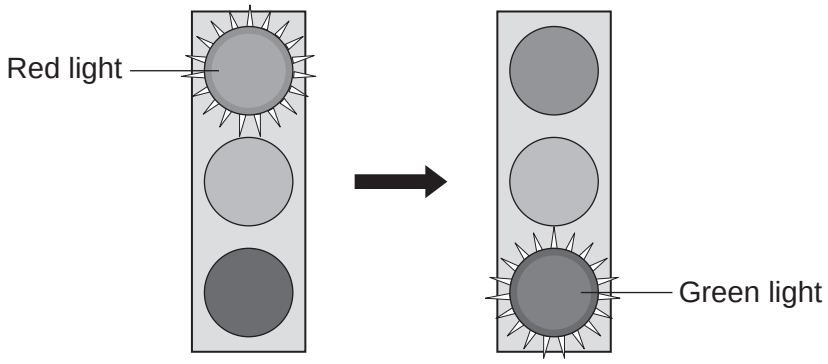
June 2016 | BL1FP | Original Q2 | Legacy

2 Car drivers need quick reactions to avoid accidents.

A student uses a computer program to measure reaction time.
The computer screen shows a traffic light on red. The traffic light then changes to green.

Figure 2 shows the change the person sees on the computer screen.

Figure 2



When the traffic light changes to green the person has to click the computer mouse as quickly as possible.
The computer program works out the time taken to react to the light changing colour.

2 (a) Special cells detect the change in colour.

2 (a) (i) What word is used to describe special cells that detect a change in the environment?

[1 mark]

Draw a ring around the correct answer.

receptor cells **reflex cells** **stimulus cells**

2 (a) (ii) Where in the body are the special cells that detect the change in colour of the traffic lights?

[1 mark]

_____

2 (b) The student used the computer program on one computer to measure the reaction times of people of different ages.

2 (b) (i) Give **one** variable the student should control so that a fair comparison can be made between the people of different ages.

[1 mark]

_____

_____

Question 27 · continued

2 (b) (ii) The student did each measurement three times to calculate a mean value. **Table 1** shows the results.

Table 1

Age in years	Mean reaction time in milliseconds
15	242
30	
45	221
60	258
75	364
90	526

The reaction times for the 30-year-old person were **192**, **174** and **180** milliseconds.

Calculate the mean reaction time of the 30-year-old person.

[1 mark]

Mean reaction time = _____ milliseconds

2 (b) (iii) Which **one** of the following is an advantage of repeating each test three times and **not** doing the test just once?

[1 mark]

Tick (✓) **one** box.

Any anomalies can be identified. ☐

The results will be more precise. ☐

There will be no errors. ☐

4.5.2.1 Structure and function

Question 27 · continued

2 (b) (iv) Some people think that old people should **not** be allowed to drive a car.

Why is it more dangerous for old people to drive cars?

Use information from **Table 1** to support your answer.

[2 marks]

_____

_____

_____

_____

7

Turn over for the next question

4.5.2.1 Structure and function

Question 28

June 2017 | BL1FP | Original Q9 | Legacy

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

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

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

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

[4 marks]

Table 3

Liquid	Organ
_____	_____
_____	_____

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

[1 mark]

_____

_____

Question 9 continues on the next page

Question 28 · continued

9 (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).

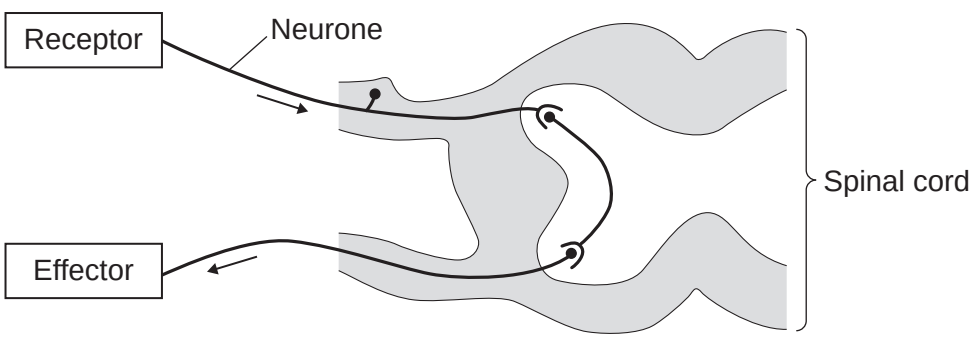
One example of a reflex is when a finger touches a hot kettle and the arm is pulled away.

Sense organs contain receptors that detect stimuli.

Effectors are muscles or glands which respond.

Figure 9 is a diagram of a simple reflex pathway.

Figure 9



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 29

June 2018 | 8461/2F | Original Q9

0 9 Many human actions are reflexes.

0 9 . 1 Which **two** of the following are examples of reflex actions?

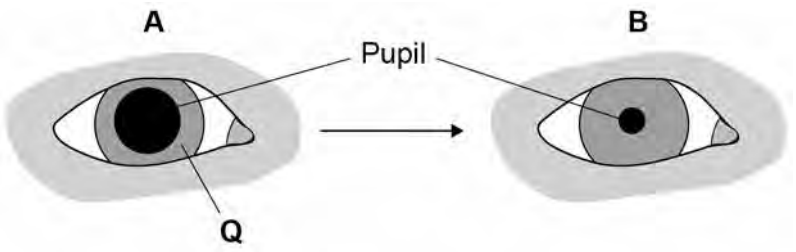
[2 marks]

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

Figure 12



0 9 . 2 Name **one** stimulus that would cause the pupil to change in size from **A** to **B**, as shown in **Figure 12**.

[1 mark]

_____

4.5.2.1 Structure and function

Question 29 · continued

0 9 . 3 Structure **Q** causes the change in size of the pupil.

Name structure **Q**.

[1 mark]

_____

0 9 . 4 Describe how structure **Q** causes the change in the size of the pupil from **A** to **B**.

[1 mark]

_____

_____

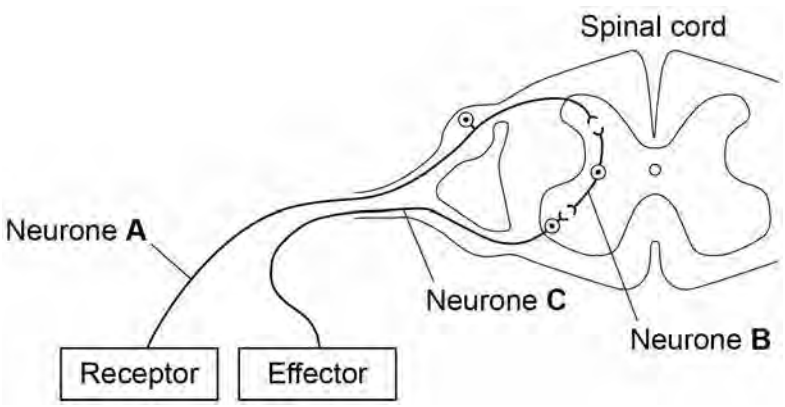
Question 9 continues on the next page

4.5.2.1 Structure and function

Question 29 · continued

0 9 . 5 **Figure 13** shows some structures involved in the coordination of a reflex action.

Figure 13



Describe how the structures shown in **Figure 13** help to coordinate a reflex action.

[6 marks]

11

4.5.2.1 Structure and function

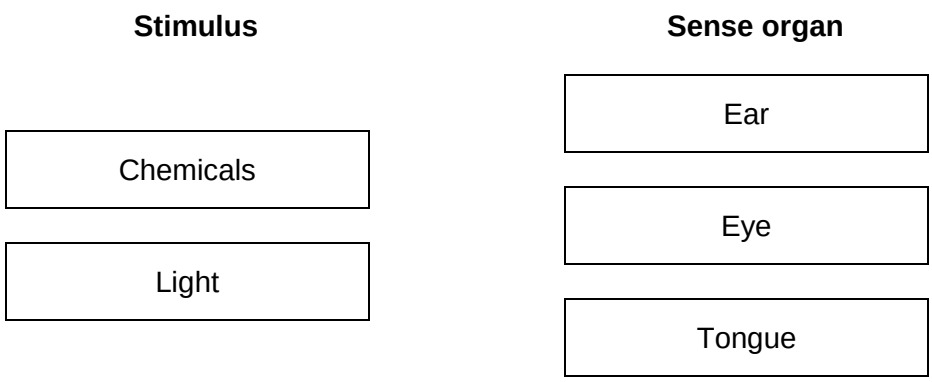
Question 30

June 2019 | 8461/2F | Original Q1

0 1 The nervous system allows a person to detect stimuli.

0 1 . 1 Draw **one** line from each stimulus to the sense organ that detects the stimulus.

[2 marks]



Moving a hand away from a hot object is an example of a reflex action.

0 1 . 2 What is a reflex action?

[2 marks]

4.5.2.1 Structure and function

Question 30 · continued

0 1 . 3 A muscle in the arm moves the hand away from the hot object.

How does the arm muscle do this?

[1 mark]

Tick (✓) **one** box.

- The muscle contracts. ☐
- The muscle expands. ☐
- The muscle relaxes. ☐
- The muscle shrinks. ☐

Question 1 continues on the next page

4.5.2.1 Structure and function

Question 30 · continued

Two students investigated the effect of drinking coffee on reaction time.

This is the method used.

1. Student **A** holds a metre rule just above student **B**'s hand, as shown in **Figure 1**.
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 1–4 another four times.
6. Student **B** then drinks a cup of coffee.
7. After 15 minutes, students **A** and **B** repeat steps 1–5.

Figure 1

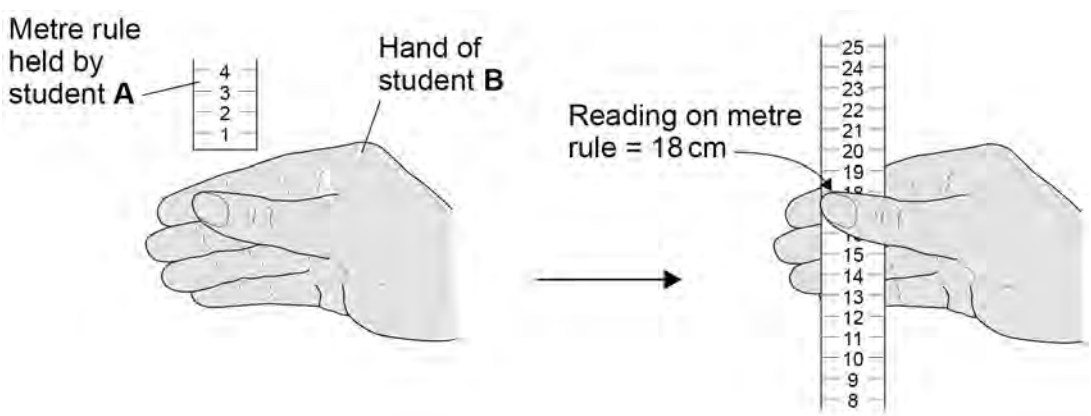


Table 1 shows some of the results.

Table 1

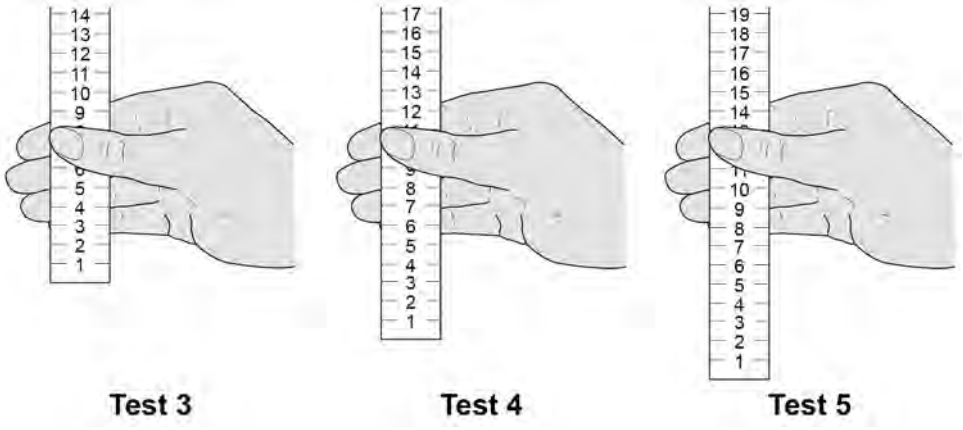
Test	Reading from scale on metre rule in cm	
	Before drinking coffee	After drinking coffee
1	18	10
2	21	14
3	15	
4	12	
5	19	

4.5.2.1 Structure and function

Question 30 · continued

Figure 2 shows the results **after** drinking the coffee for tests **3**, **4** and **5**.

Figure 2



0 1 . 4 Complete **Table 1**.

Use results from **Figure 2**.

[2 marks]

The students made the following conclusion:

'Drinking coffee speeds up reactions.'

0 1 . 5 Give evidence from **Table 1** to support the students' conclusion.

[1 mark]

0 1 . 6 The students' conclusion may **not** be valid.

Suggest **two** improvements the students could make to their method.

[2 marks]

1

2

10

4.5.2.1 Structure and function

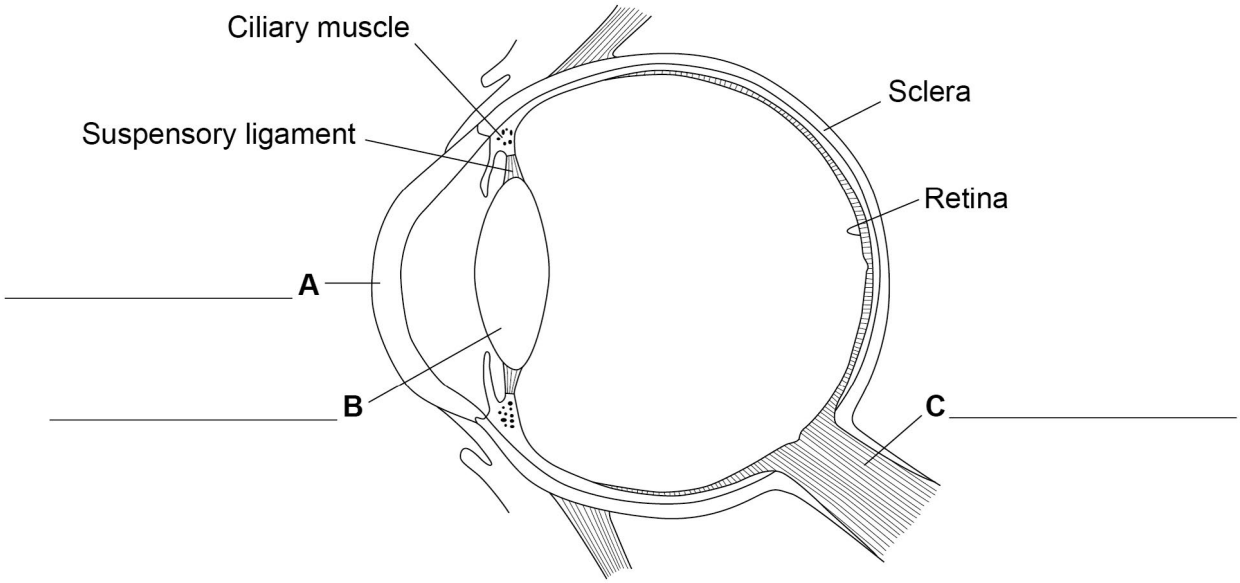
Question 31

November 2021 | 8461/2F | Original Q4

0 4 The human eye can form images of objects that are at different distances away from the eye.

Figure 7 is a diagram of the eye.

Figure 7



0 4 . 1 Label structures **A**, **B** and **C** on **Figure 7**.

[3 marks]

Choose answers from the box.

cornea	**eyelid**	**iris**	**lens**	**optic nerve**

4.5.2.1 Structure and function

Question 31 · continued

The eye in **Figure 7** is focused on a distant object.

If the eye then focuses on the words in a book, changes would occur in the eye.

The light rays would be refracted more by the lens.

0 4 . 2 How does the lens refract the light more?

[1 mark]

Tick (✓) **one** box.

- By becoming longer ☐
- By becoming thicker ☐
- By becoming transparent ☐

0 4 . 3 Which **two** structures control the shape of the lens?

[2 marks]

Tick (✓) **two** boxes.

- Ciliary muscles ☐
- Cornea ☐
- Iris ☐
- Sclera ☐
- Suspensory ligaments ☐

0 4 . 4 To form a clear image, the light rays entering the eye must focus on one structure in the eye.

Name the structure.

[1 mark]

_____

Question 4 continues on the next page

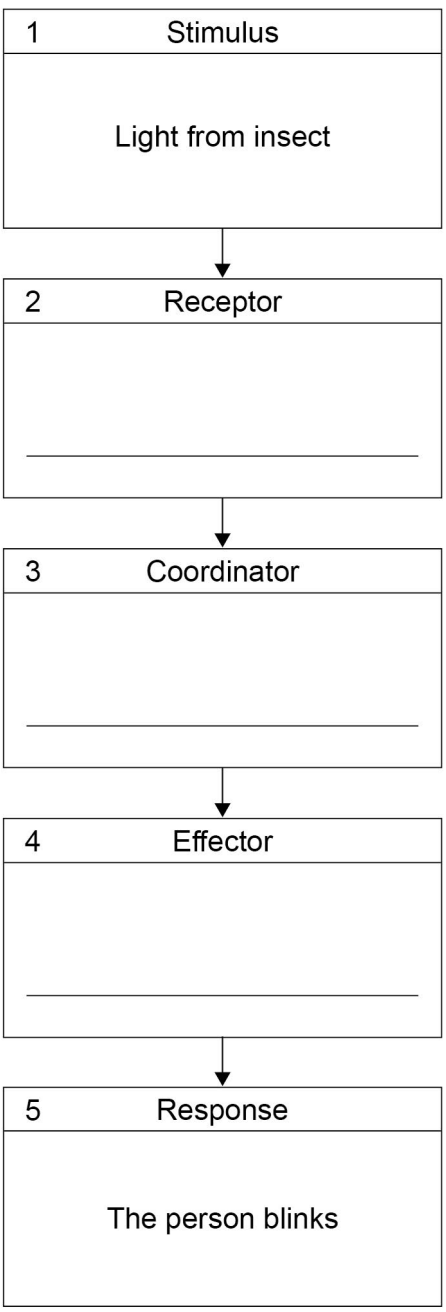
4.5.2.1 Structure and function

Question 31 · continued

0 4 . 5 An insect flies near a person's eye. The person blinks.
This is a reflex action.

Figure 8 shows the coordination system for this reflex action.

Figure 8



Complete **Figure 8**.

[2 marks]

Choose answers from the box below.

Write **one** word in each of boxes **2**, **3** and **4** of **Figure 8**.

brain	**cornea**	**iris**	**muscles**	**retina**

9

4.5.2.1 Structure and function

Question 32

0 2 Many human actions are reflexes.

0 2 . 1 Which statement describes a reflex action?

[1 mark]

Tick (✓) **one** box.

A reflex action does not need a sense organ. ☐

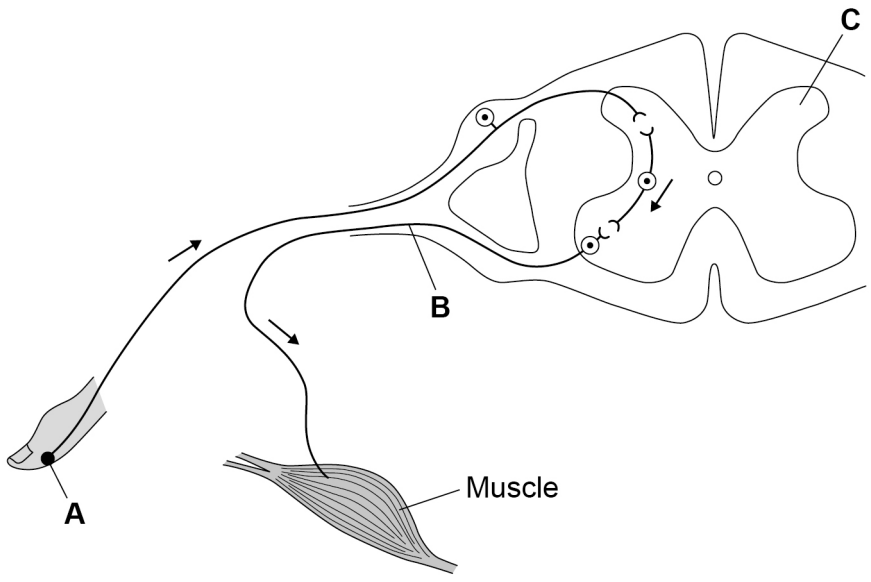
A reflex action is a slow action. ☐

A reflex action is automatic. ☐

Figure 3 shows the nerve pathway for a reflex action.

The arrows show the direction of the nerve impulse.

Figure 3



4.5.2.1 Structure and function

Question 32 · continued

0 2 . 2 Draw **one** line from each part of the nerve pathway to the name of that part.

Use **Figure 3**.

[3 marks]

Part of nerve pathway	Name of part
	Motor neurone
A	
	Receptor
B	
	Relay neurone
C	
	Spinal cord

0 2 . 3 Which **two** human actions are reflexes?

[2 marks]

Tick (✓) **two** boxes.

- Blinking when an insect flies into the eye ☐
- Catching a ball in a playground game ☐
- Playing a musical instrument ☐
- Removing the hand from a hot object ☐
- Writing a message to a friend ☐

Question 2 continues on the next page

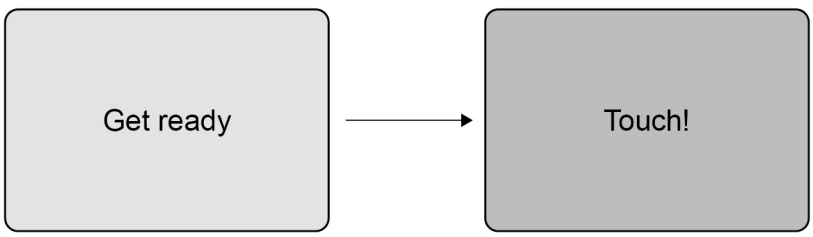
4.5.2.1 Structure and function

Question 32 · continued

Students investigated their reaction times using a computer program.

Figure 4 shows a sequence of two screens in the computer program.

Figure 4



Red screen **Green screen**

This is the method used.

1. Open the reaction time program.
2. When the screen turns from red to green, touch the screen as quickly as possible.
3. Record the reaction time shown on the screen.
4. Re-set to the red screen.
5. Repeat steps 2 to 4 four more times.
6. Repeat steps 1 to 5 for each student.

Table 1 shows the results.

Table 1

Test	Reaction time in milliseconds			
	Student P	Student Q	Student R	Student S
1	317	310	367	320
2	309	293	352	304
3	290	312	350	315
4	333	307	359	308
5	328	312	635	313
Mean	315	307	357	**X**

4.5.2.1 Structure and function

Question 32 · continued

0 2 . 4 Calculate mean value **X** in **Table 1**.

[2 marks]

X = _____ milliseconds

0 2 . 5 There is an anomalous result for student **R**.

Draw a ring around the anomalous result in **Table 1**.

[1 mark]

0 2 . 6 Give **two** factors that might affect a person's reaction time.

[2 marks]

1 _____

2 _____

11

4.5.2.1 Structure and function

Question 33

June 2023 | 8461/2F | Original Q8

0 8 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 8 . 1 Which term describes the adjustment of focus from the distant object to the near object?

[1 mark]

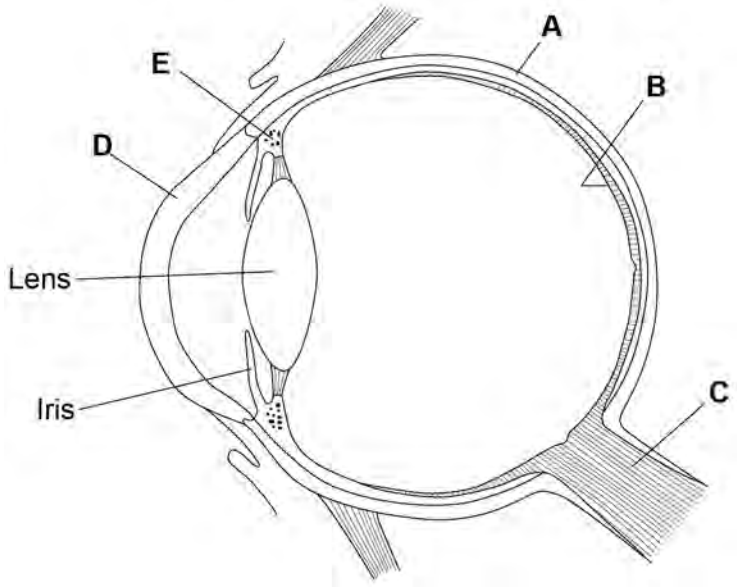
Tick (✓) **one** box.

- Accommodation ☐
- Adaptation ☐
- Hyperopia ☐
- Myopia ☐

Figure 14 shows the eye.

Figure 14

.



4.5.2.1 Structure and function

Question 33 · continued

0 8 . 2 Which structure in **Figure 14** is where the image is focused?

[1 mark]

Tick (✓) **one** box.

A ☐ **B** ☐ **C** ☐ **D** ☐ **E** ☐

0 8 . 3 Which structure in **Figure 14** is a muscle that contracts when focusing on a near object?

[1 mark]

Tick (✓) **one** box.

A ☐ **B** ☐ **C** ☐ **D** ☐ **E** ☐

0 8 . 4 What happens to the shape of the lens when focusing on a near object?

[1 mark]

0 8 . 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]

Question 8 continues on the next page

4.5.2.1 Structure and function

Question 33 · continued

0 8 . 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 34

June 2024 | 8461/2F | Original Q1

0 1 The nervous system allows humans to:

- respond to stimuli
- coordinate their behaviour.

0 1 . 1 Complete the order of structures to link a stimulus to a response.

[2 marks]

Choose answers from the box.

coordinator	**effector**	**receptor**

stimulus ⟶ _____ ⟶ _____ ⟶ _____ ⟶ response

0 1 . 2 Some human actions are reflex actions.

What is a reflex action?

[2 marks]

4.5.2.1 Structure and function

Question 34 · continued

0 1 . 3 Which is an example of a reflex action?

[1 mark]

Tick (✓) **one** box.

- Blinking in sudden bright light ☐
- Kicking a ball in a game ☐
- Writing a message to a friend ☐

0 1 . 4 Many reflex actions are movements.

What type of tissue causes movement?

[1 mark]

Tick (✓) **one** box.

- Blood ☐
- Gland ☐
- Muscle ☐

Question 1 continues on the next page

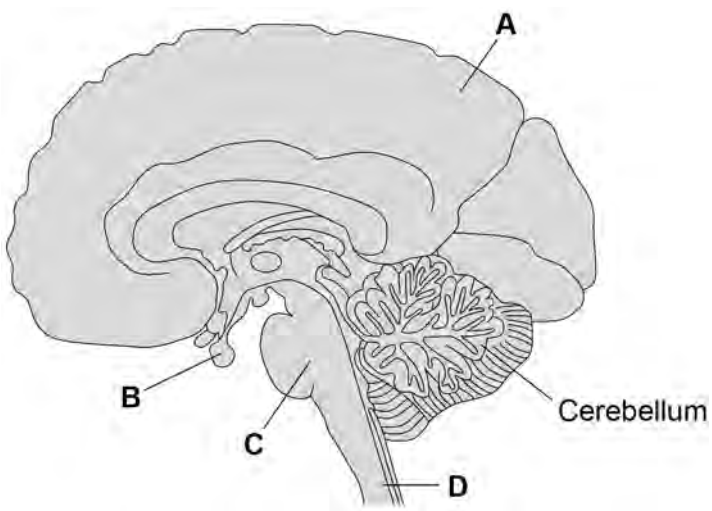
4.5.2.1 Structure and function

Question 34 · continued

Many human activities are coordinated by the brain.

Figure 1 shows the human brain.

Figure 1



0 1 . 5 Which structure in **Figure 1** is the pituitary gland?

[1 mark]

Tick (✓) **one** box.

A ☐ **B** ☐ **C** ☐ **D** ☐

0 1 . 6 Which structure in **Figure 1** is the cerebral cortex?

[1 mark]

Tick (✓) **one** box.

A ☐ **B** ☐ **C** ☐ **D** ☐

4.5.2.1 Structure and function

Question 34 · continued

0 1 . 7 What is the function of the cerebellum?

[1 mark]

Tick (✓) **one** box.

- Balance ☐
- Hearing ☐
- Sight ☐

9

Turn over for the next question

4.5.2.1 Structure and function

Question 35

June 2025 | 8461/2F | Original Q2

0 2 Some human responses are reflex actions.

0 2 . 1 Give **two** features of a reflex action.

[2 marks]

1 _____

_____

2 _____

_____

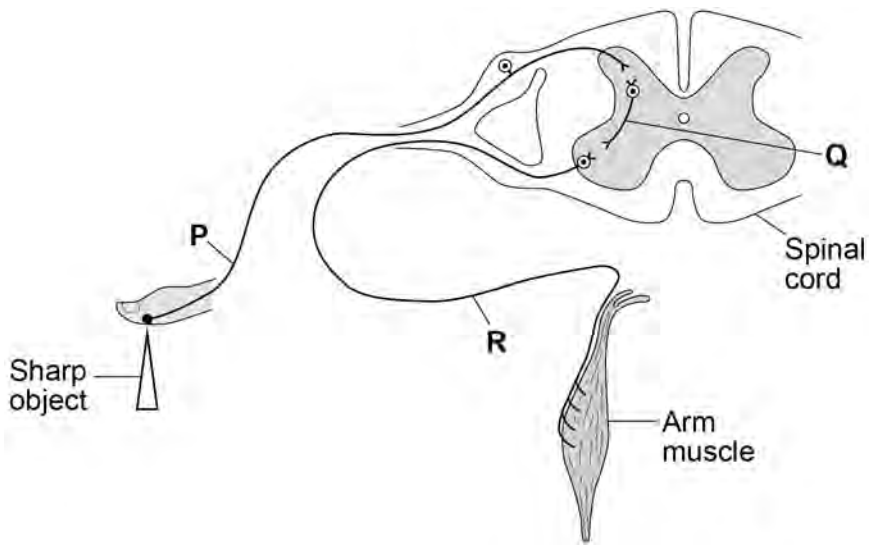
Question 2 continues on the next page

4.5.2.1 Structure and function

Question 35 · continued

Figure 3 shows the nerve pathway for moving a hand away from a sharp object.

Figure 3



0 2 . 2 Complete the sentences.

Choose answers from the box.

[2 marks]

coordinator	effector	receptor	stimulus

When the finger touches the sharp object, the point

stimulates the _____.

Nerve impulses reach the arm muscle which is the _____.

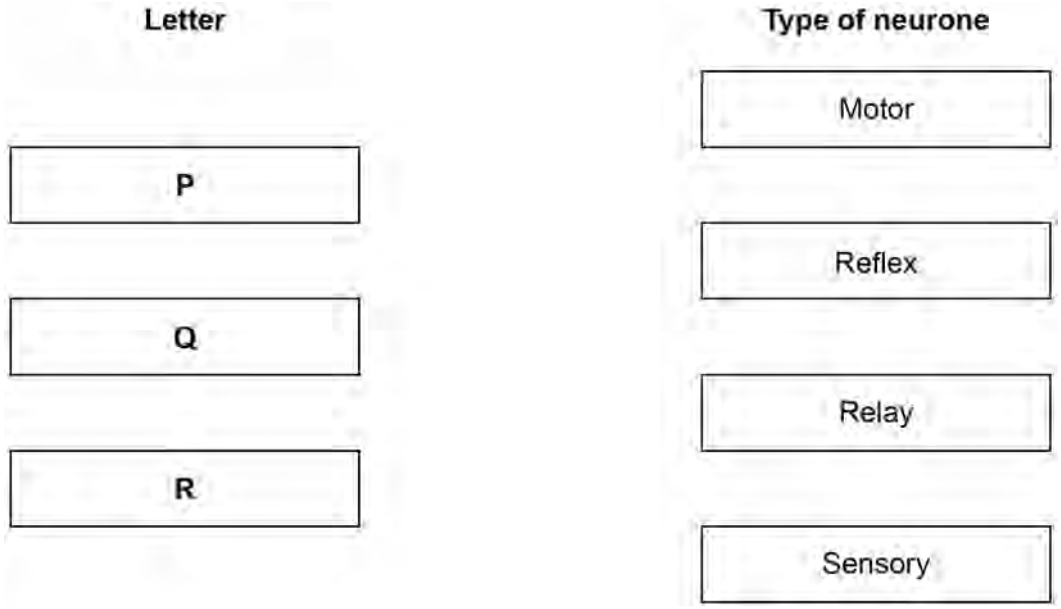
4.5.2.1 Structure and function

Question 35 · continued

0 2 . 3 **P**, **Q** and **R** in **Figure 3** are three types of neurone.

Draw **one** line from each letter to the type of neurone.

[3 marks]



0 2 . 4 The gap between two neurones is called a synapse.

How does information travel across the synapse?

[1 mark]

Tick (✓) **one** box.

As a chemical ☐

As pain ☐

As sound ☐

Question 2 continues on the next page

Question 35 · continued

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 4**.
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 two more times.

Figure 4

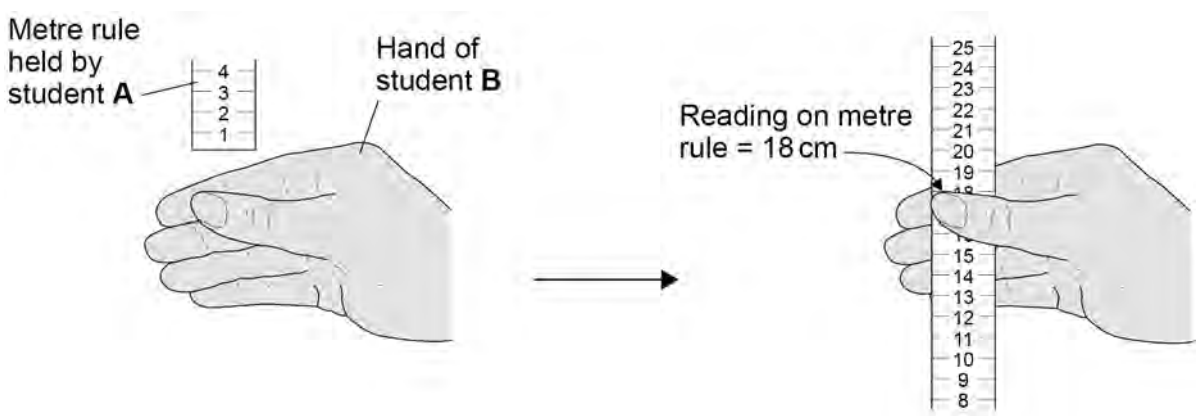


Table 1 shows the results.

Table 1

Test	Reading on metre rule in cm
1	18
2	17
3	13
Mean	**X**

4.5.2.1 Structure and function

Question 35 · continued

0 2 . 5 Calculate mean value **X** in **Table 1**.

[2 marks]

X = _____ cm

0 2 . 6 The students concluded:

'Practice improved the speed of student **B**'s reaction.'

Give evidence for the students' conclusion.

Use **Table 1**.

[1 mark]

0 2 . 7 Suggest **one** way to improve the investigation.

[1 mark]

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