AQA GCSE Biology | 8461

SPECIFICATION POINT 4.5.2.2

The brain (biology only)

Past-paper questions

Tier	**Higher**
Question groups	**22**
Available paper years	**2007–2021**

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.

4.5.2.2 The brain (biology only)

Question 01

March 2007 | BLY1A | Original Q2 | Legacy

QUESTION TWO

This table is about some possible effects of some substances on the body.

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

A may cause damage to the liver and brain

B may cause less oxygen to be carried by the blood

C may cause withdrawal symptoms

D may lead to becoming addicted to a hard drug

	May be caused by . . .
1	breathing in carbon monoxide in cigarette smoke.
2	drinking alcohol.
3	giving up taking cocaine.
4	taking cannabis.

4.5.2.2 The brain (biology only)

Question 02

November 2007 | BLY1B | Original Q8 | Legacy

QUESTION EIGHT

This question is about evolution.

8A Darwin suggested the theory of evolution by natural selection.

Darwin's theory states that . . .

1 living organisms respond quickly to changes in the environment.

2 all living organisms are related to each other.

3 organisms mutate if environmental conditions change.

4 organisms with successful adaptations are more likely to survive.

8B Darwin suggested that humans and apes have a common ancestor.

This suggestion was most strongly opposed at the time by . . .

1 the general public.

2 teachers.

3 religious leaders.

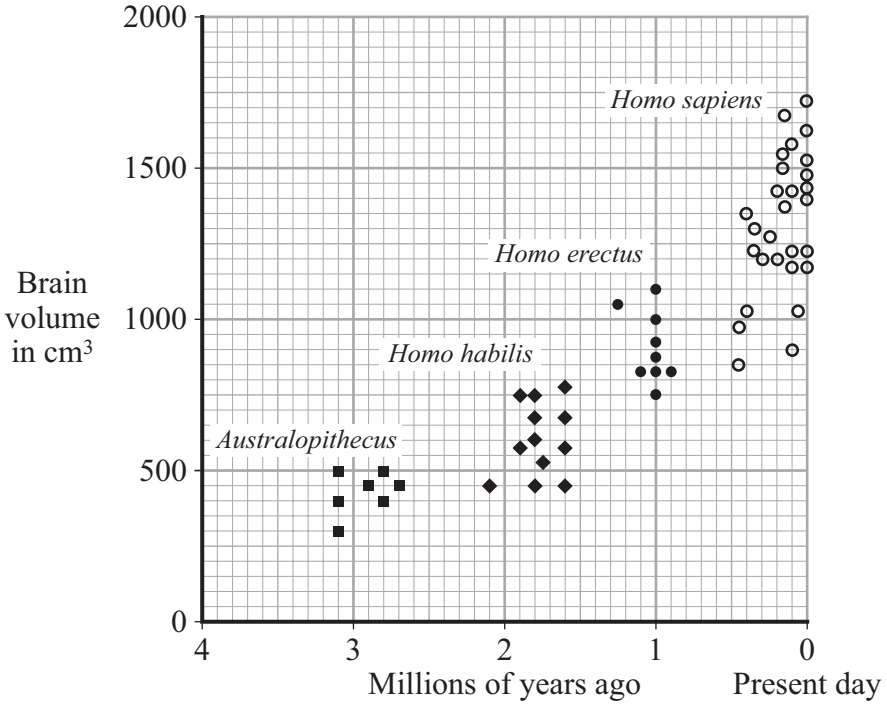
4 members of parliament.

4.5.2.2 The brain (biology only)

Question 02 · continued November 2007 | BLY1B | Original Q8 | Legacy

Modern humans belong to the species *Homo sapiens*. Most scientists think that *Homo sapiens* is related to more primitive species. Three of these primitive species were *Australopithecus*, *Homo habilis* and *Homo erectus*. These three species are now extinct.

The graph shows the volume of the brain of several specimens from each of the species.



8C Which method of measuring the volume of the brain of the extinct species would give the most accurate results?

1 weighing the fossil skulls on an electronic balance

2 measuring the radius of the fossil skulls, then using this to calculate the volume

3 filling the fossil skulls with sand, then pouring the sand into a measuring cylinder

4 measuring the volume of water displaced by fossil skulls

8D The data suggests that . . .

1 *Australopithecus* had a mean brain volume of 500 cm^3.

2 all modern humans have bigger brains than their fossil ancestors.

3 *Homo sapiens* is more intelligent than *Homo habilis*.

4 mean brain volume has increased during the evolution of humans.

4.5.2.2 The brain (biology only)

Question 03

January 2008 | BLY1H | Original Q5 | Legacy

5 The MMR vaccine is used to protect children against measles, mumps and rubella.

(a) Explain, as fully as you can, how the MMR vaccine protects children from these diseases.

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(3 marks)

(b) Read the passage.

> Autism is a brain disorder that can result in behavioural problems. In 1998, Dr Andrew Wakefield published a report in a medical journal. Dr Wakefield and his colleagues had carried out tests on 12 autistic children.
>
> Dr Wakefield and his colleagues claimed to have found a possible link between the MMR vaccine and autism.
>
> Dr Wakefield wrote that the parents of eight of the twelve children blamed the MMR vaccine for autism. He said that symptoms of autism had started within days of vaccination.
>
> Some newspapers used parts of the report in scare stories about the MMR vaccine. As a result, many parents refused to have their children vaccinated.
>
> Dr Wakefield's research was being funded through solicitors for the twelve children. The lawyers wanted evidence to use against vaccine manufacturers.

4.5.2.2 The brain (biology only)

Question 03 · continued

BLANK

Use information from the passage on the opposite page to answer these questions.

(i) Was Dr Wakefield's report based on reliable scientific evidence?

Explain the reasons for your answer.

.....

.....

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.....

(2 marks)

(ii) Might Dr Wakefield's report have been biased?

Give the reason for your answer.

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.....

(1 mark)

6

4.5.2.2 The brain (biology only)

Question 04

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)

4.5.2.2 The brain (biology only)

Question 04 · 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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.....

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.....

(2 marks)

8

Turn over for the next question

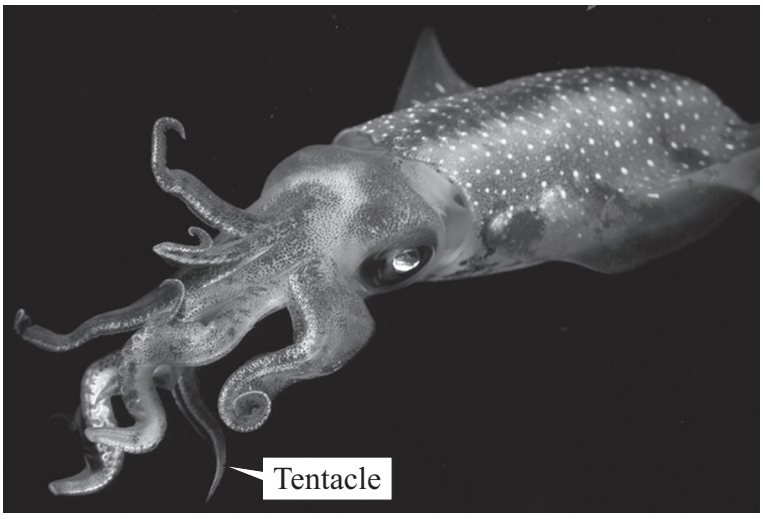
4.5.2.2 The brain (biology only)

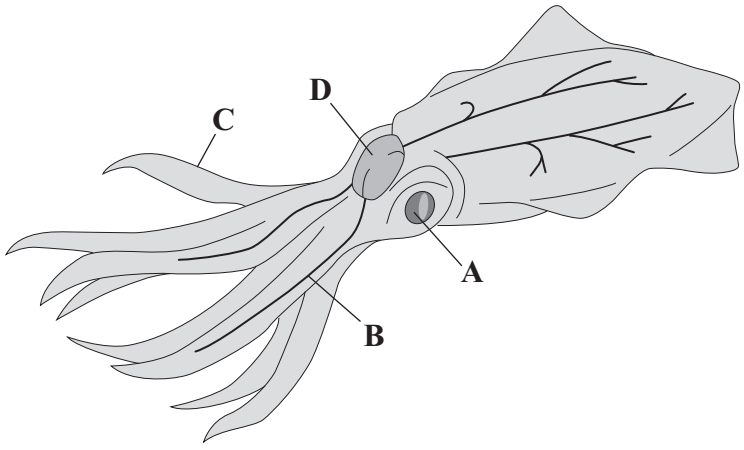
Question 05

March 2010 | BLY1AP | Original Q2 | Legacy

QUESTION TWO

The photograph shows a squid. The diagram shows some of its organs. When a squid sees a fish, it tries to catch it with its tentacles.





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

1	brain
2	effector
3	nerve
4	receptor

4.5.2.2 The brain (biology only)

Question 06

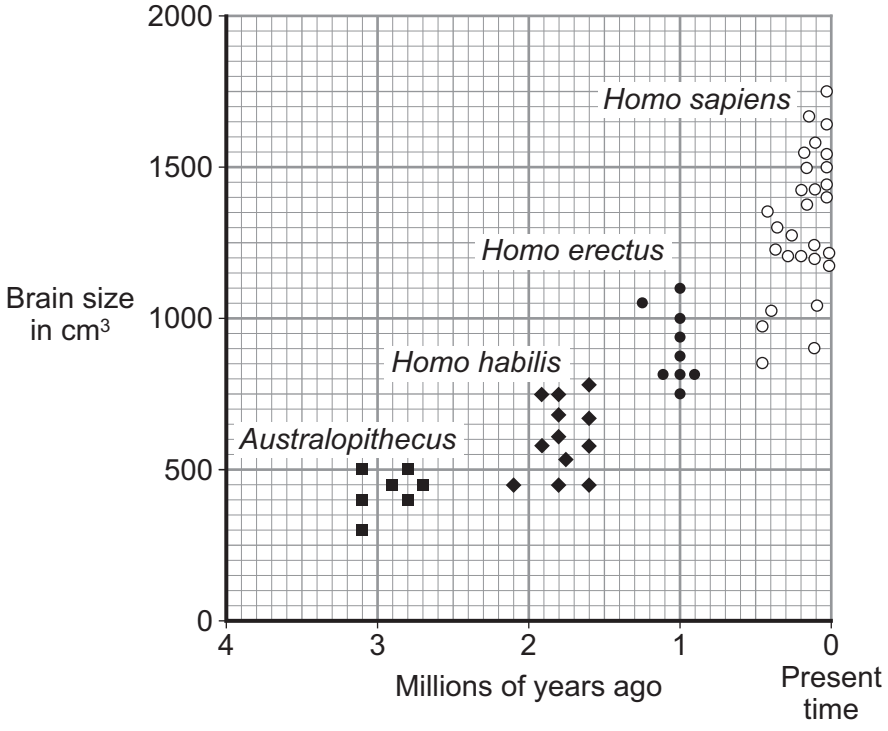
June 2010 | BLY1BP | Original Q7 | Legacy

QUESTION SEVEN

Modern humans belong to the species *Homo sapiens*. Many people think that modern humans evolved from more primitive species. Three of these primitive species were *Australopithecus*, *Homo habilis* and *Homo erectus*. These three species are now extinct.

Scientists investigated the brain size of several specimens from each of the species.

The graph shows their results.



7A The ranges of brain size of *Homo sapiens* and *Homo erectus* overlap by . . .

1 200 cm^3

2 250 cm^3

3 300 cm^3

4 1000 cm^3

7B From this data, the time over which *Australopithecus* existed was . . .

1 0.2 million years.

2 0.4 million years.

3 3.1 million years.

4 3.3 million years.

4.5.2.2 The brain (biology only)

Question 06 · continued

7C Which one of the following is correct?

The fossil data for . . .

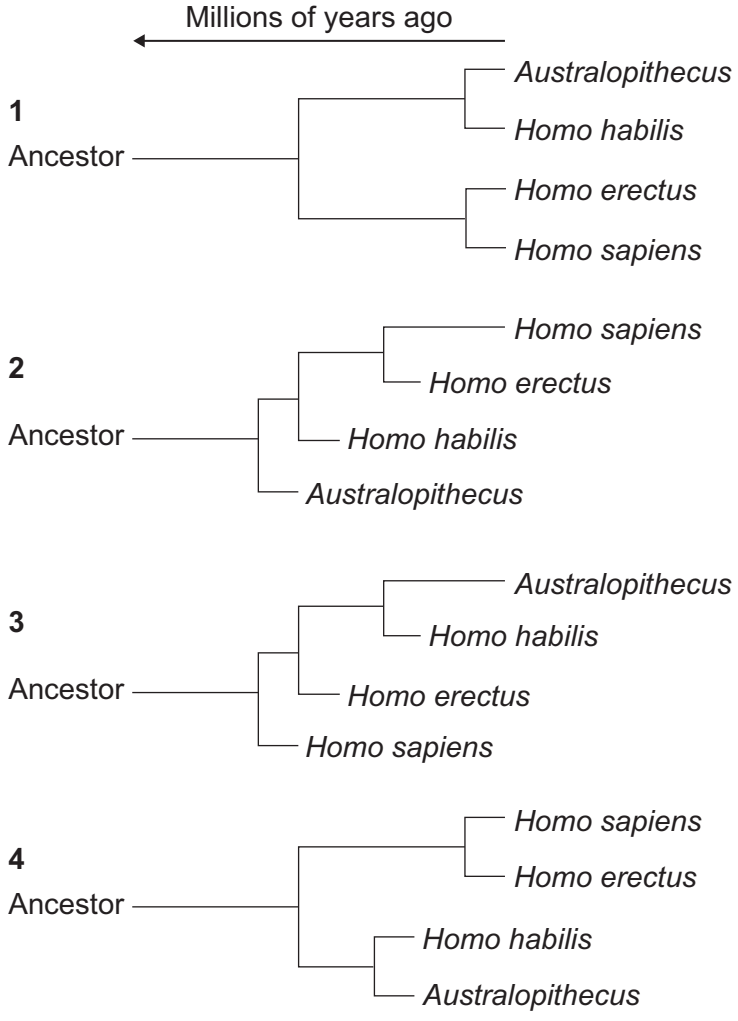
1 *Australopithecus* can be considered least reliable because the fewest number of skulls have been found.

2 *Homo habilis* can be considered to be most reliable because they were fossilised over the longest period of time.

3 *Homo erectus* can be considered most reliable because they were fossilised over the shortest period of time.

4 *Homo sapiens* can be considered least reliable because they were fossilised most recently.

7D Which evolutionary tree is supported by the evidence in the graph?



4.5.2.2 The brain (biology only)

Question 07

June 2019 | BLY1H | Original Q6 | Legacy

6 Scientists have recently cloned a mouse that had died and been frozen for 16 years.

6 (a) Explain what is meant by a clone.

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(2 marks)

6 (b) The scientists used an egg cell from a living mouse and the genetic material from a brain cell of the frozen mouse.

Describe how the process of adult cell cloning could be used to clone the frozen mouse.

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(3 marks)

6 (c) People could ask scientists to use this technique to clone long-dead relatives, whose bodies have been deep-frozen.

Most people would be opposed to cloning a human from a deep-frozen, long-dead relative.

Give **one** reason why.

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.....

(1 mark)

6

4.5.2.2 The brain (biology only)

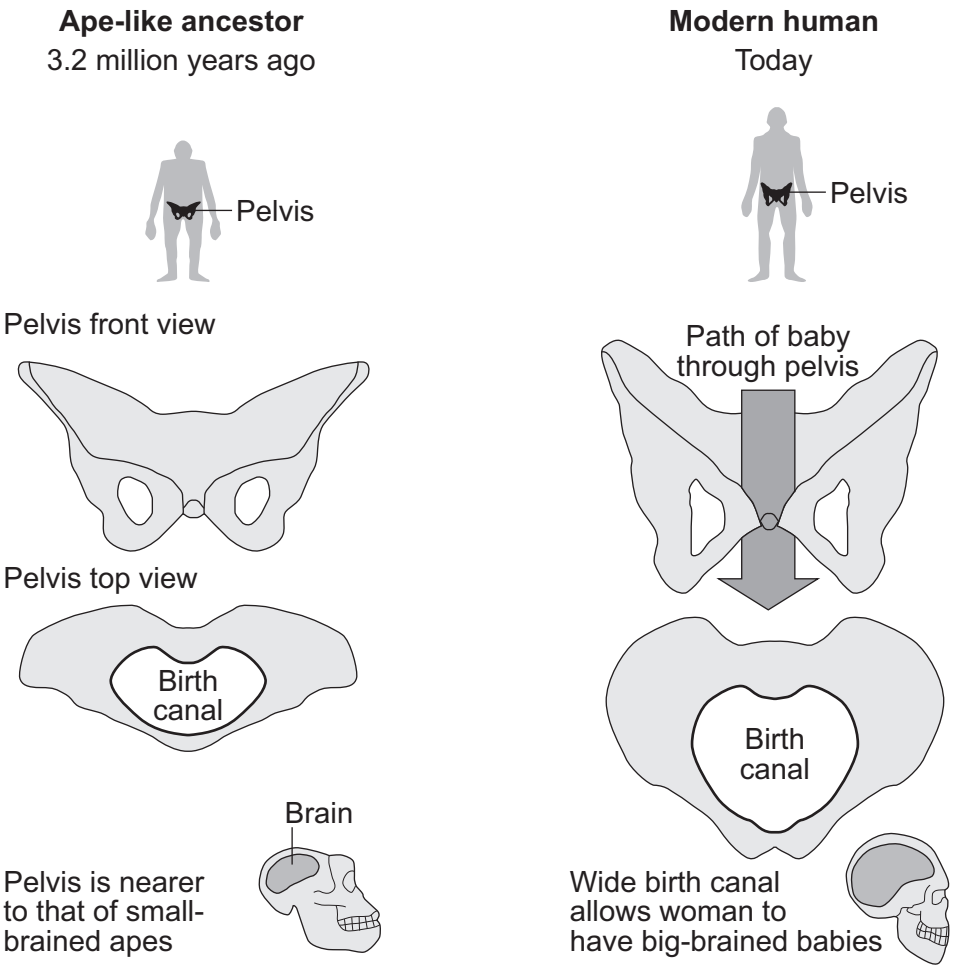
Question 08

7 Humans have evolved from ape-like ancestors by natural selection.

The drawing shows the pelvis of an ape-like ancestor and a modern human.

The skull and brain of the new born baby are also shown to the same scale.

Modern humans are much more intelligent than their ape-like ancestors.



4.5.2.2 The brain (biology only)

Question 08 · continued

Suggest an explanation for the evolution of the size and shape of the pelvis of modern humans.

Use information from the drawing to help you.

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(4 marks)

4

4.5.2.2 The brain (biology only)

Question 09

1 The table shows the volume of blood flowing through different organs at three levels of exercise.

Organ(s)	Volume of blood flowing through organ(s) in cm^3 per minute		
	Light exercise	**Moderate exercise**	**Heavy exercise**
Gut	1 100	600	300
Kidneys	900	600	250
Brain	750	750	750
Heart muscles	350	750	1 000
Skeletal muscles	4 500	12 500	22 000
Skin	1 500	1 900	600
Other	400	500	100
Total	**9 500**	**17 600**	**25 000**

1 (a) (i) Which organ has a constant flow of blood through it?

.....

(1 mark)

1 (a) (ii) Which organ has the greatest reduction in the volume of blood supplied during heavy exercise compared with light exercise?

.....

(1 mark)

1 (a) (iii) What proportion of the blood flows through the heart muscle during heavy exercise?

.....

(1 mark)

4.5.2.2 The brain (biology only)

Question 09 · continued

1 (b) The volume of blood flowing through the skeletal muscles increases greatly during exercise.

Give **two** ways in which the body brings about this increase.

1 .....

.....

2 .....

.....

(2 marks)

1 (c) During exercise, the concentration of carbon dioxide in the blood increases.

Explain what causes this increase.

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(3 marks)

8

4.5.2.2 The brain (biology only)

Question 10

June 2011 | BLY2H | Original Q7 | Legacy

7 A walker falls through thin ice into very cold water.



The walker's core body temperature falls. He may die of hypothermia (when core body temperature falls too low).

7 (a) (i) Which part of the brain monitors the fall in core body temperature?

.....

(1 mark)

7 (a) (ii) How does this part of the brain detect the fall in core body temperature?

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(2 marks)

7 (b) While in the water the walker begins to shiver.

Shivering helps to stop the core body temperature falling too quickly.

Explain how.

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(2 marks)

4.5.2.2 The brain (biology only)

Question 10 · continued

7 (c) The walker had been drinking alcohol.

Alcohol causes changes to the blood vessels supplying the skin capillaries, making the skin look red.

7 (c) (i) Describe the change to the blood vessels.

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.....

(1 mark)

7 (c) (ii) The walker is much more likely to die of hypothermia than someone who has not been drinking alcohol.

Explain why.

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(2 marks)

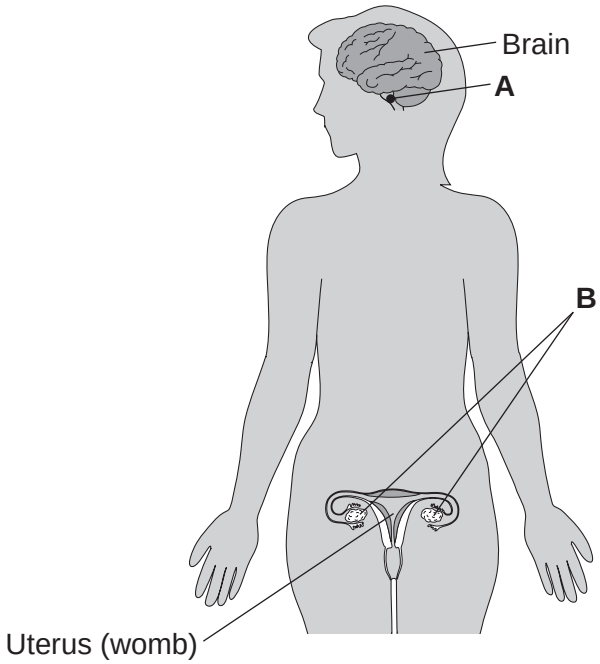
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4.5.2.2 The brain (biology only)

Question 11

January 2013 | BL1HP | Original Q2 | Legacy

2 The diagram shows the position of two glands, **A** and **B**, in a woman.



2 (a) (i) Name glands **A** and **B**.

A .....

B .....

(2 marks)

2 (a) (ii) Gland **A** produces the hormone Follicle Stimulating Hormone (FSH).

FSH controls changes in gland **B**.

How does FSH move from gland **A** to gland **B**?

.....

(1 mark)

Question 2 continues on the next page

4.5.2.2 The brain (biology only)

Question 11 · continued

2 (b) (i) A woman is not able to become pregnant. The woman does not produce mature eggs. The woman decides to have In Vitro Fertilisation (IVF) treatment.

Which **two** hormones will help the woman produce and release mature eggs?

Tick (✓) **one** box.

FSH and Luteinising Hormone (LH) ☐

FSH and oestrogen ☐

Luteinising Hormone (LH) and oestrogen ☐

(1 mark)

2 (b) (ii) Giving these hormones to the woman helps her to produce several mature eggs. Doctors collect the mature eggs from the woman in an operation.

Describe how the mature eggs are used in IVF treatment so that the woman may become pregnant.

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(3 marks)

2 (b) (iii) IVF clinics have been set a target to reduce multiple births.

> At least 76% of IVF treatments should result in single babies and a maximum of 24% of treatments should result in multiple births.

Suggest **one** reason why the clinics have been set this target to reduce multiple births.

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(1 mark)

4.5.2.2 The brain (biology only)

Question 11 · continued

2 (c) Two clinics, **R** and **S**, used IVF treatment on women in 2007. Doctors at each clinic used the results of the treatments to predict the success rate of treatments in 2008.

The table shows the information.

	Total number of IVF treatments in 2007	Number of IVF treatments resulting in pregnancy in 2007	Predicted percentage success rate in 2008
Clinic **R**	1004	200	18 – 23
Clinic **S**	98	20	3 – 56

2 (c) (i) Compare the success rates of the two clinics in 2007.

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(1 mark)

2 (c) (ii) The range of the predicted success rate in 2008 for clinic **R** is much smaller than the range of the predicted success rate for clinic **S**.

Suggest why.

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(2 marks)

11

4.5.2.2 The brain (biology only)

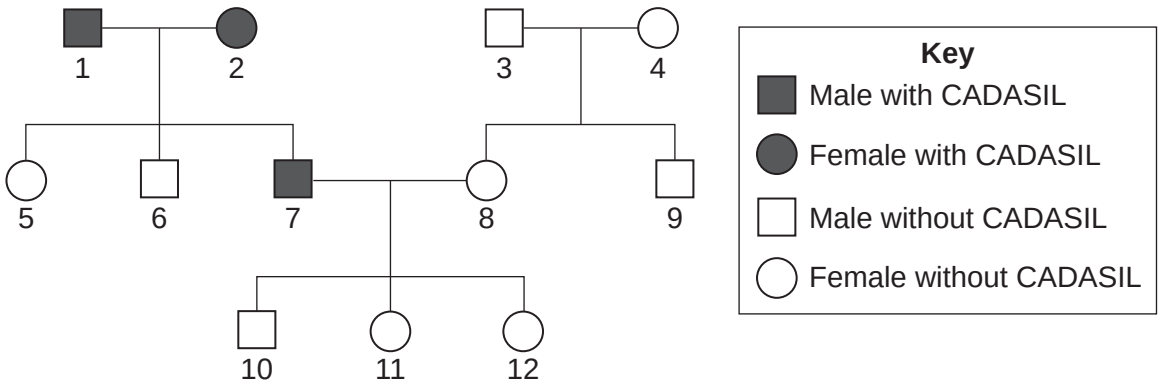
Question 12

January 2013 | BL2HP | Original Q6 | Legacy

6 CADASIL is an inherited disorder caused by a dominant allele.

CADASIL leads to weakening of blood vessels in the brain.

The diagram shows the inheritance of CADASIL in one family.



6 (a) CADASIL is caused by a *dominant allele*.

6 (a) (i) What is a *dominant allele*?

.....

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(1 mark)

6 (a) (ii) What is the evidence in the diagram that CADASIL is caused by a dominant allele?

.....

.....

(1 mark)

6 (a) (iii) Person **7** has CADASIL.

Is person **7** homozygous or heterozygous for the CADASIL allele?

Give evidence for your answer from the diagram.

.....

.....

(1 mark)

4.5.2.2 The brain (biology only)

Question 12 · continued

6 (b) Persons **7** and **8** are planning to have another baby.
Use a genetic diagram to find the probability that the new baby will develop into a person with CADASIL.

Use the following symbols to represent alleles.

D = allele for CADASIL
d = allele for not having CADASIL

Probability = ...
(4 marks)

6 (c) Scientists are trying to develop a treatment for CADASIL using stem cells.

Specially treated stem cells would be injected into the damaged part of the brain.

6 (c) (i) Why do the scientists use stem cells?

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(2 marks)

6 (c) (ii) Embryonic stem cells can be obtained by removing a few cells from a human embryo.

In 2006, scientists in Japan discovered how to change adult skin cells into stem cells.

Suggest **one** advantage of using stem cells from adult skin cells.

.....

.....
(1 mark)

10

4.5.2.2 The brain (biology only)

Question 13

June 2013 | BL1HP | Original Q6 | Legacy

6 Drugs are used to treat cardiovascular diseases (diseases of the heart and blood vessels).

6 (a) What is a drug?

.....

.....

(1 mark)

6 (b) People can be treated for cardiovascular diseases with statins or aspirin.

Information about these two drugs is given in the table.

STATINS	ASPIRIN
Statins are only available on prescription from doctors. In studies, 30 000 patients were monitored over several years. Statins were found to reduce the rate of non-fatal heart attacks by about 30%. Approximately 0.1% of the patients suffered serious muscle damage and 0.01% suffered kidney failure. Statins reduce blood cholesterol which builds up in the walls of blood vessels. The cost of treating patients with statins can vary between £150 and £500 per year, depending on the type of cardiovascular disease being treated.	Aspirin can be bought over the counter. Treatment with aspirin costs up to £15 per year. In a study of 1000 patients, aspirin was found to cause bleeding of the stomach in around 0.5% of patients and there was a slightly increased risk of poor blood clotting at cuts. There was a slightly increased risk of damage to the blood vessels in the brain in older patients. Aspirin was found to reduce the risk of non-fatal heart attacks by 31%.

4.5.2.2 The brain (biology only)

Question 13 · continued

Would you recommend statins or aspirin for the treatment of cardiovascular diseases?

In your answer you should:

- give your recommendation
- use information from the table to support your recommendation by making comparisons of the two drugs.

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(5 marks)

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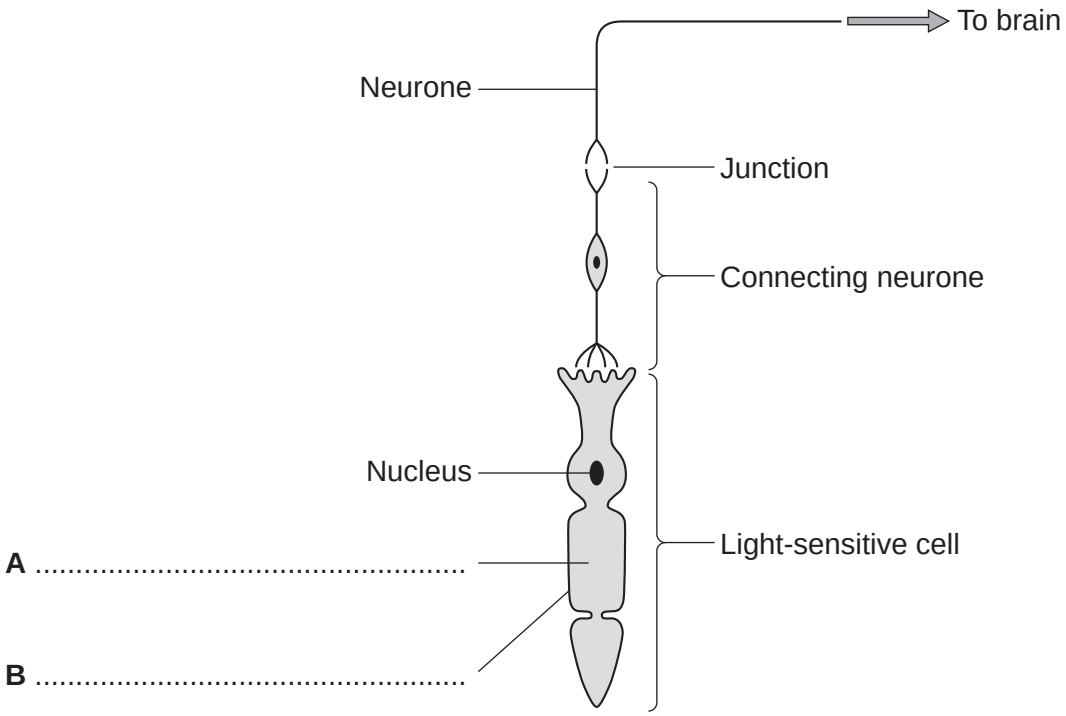
4.5.2.2 The brain (biology only)

Question 14

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?

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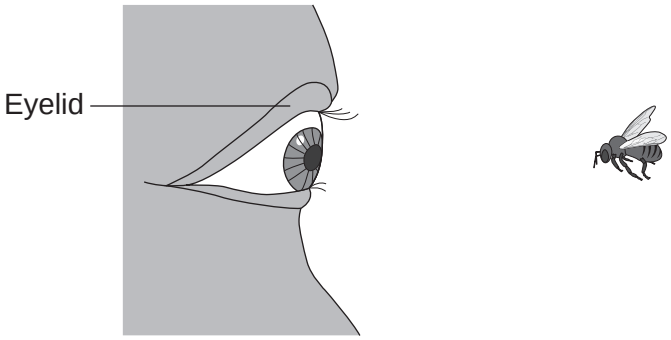
(1 mark)

4.5.2.2 The brain (biology only)

Question 14 · 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

4.5.2.2 The brain (biology only)

Question 15

June 2013 | BL2HP | Original Q6 | Legacy

6 A certain gene codes for the production of an enzyme called 'HEXA'.

One human genetic disorder causes damage to nerve cells in the brain.
This disorder is caused by a small change in the DNA of the HEXA gene.
People with this disorder make a changed HEXA enzyme that does not work.

6 (a) Explain how a change in the DNA of the HEXA gene can result in the production of a changed HEXA enzyme that does not work.

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(3 marks)

6 (b) The gene coding for the HEXA enzyme is found on chromosome number 15.

6 (b) (i) How many chromosomes are there in the nucleus of a human nerve cell? .....

(1 mark)

6 (b) (ii) A boy had the changed HEXA gene on the chromosome number 15 that he inherited from his father.
The changed HEXA gene coded for a HEXA enzyme that does not work.
The boy did **not** develop the genetic disorder.

Explain why the boy did **not** develop the genetic disorder.

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(2 marks)

4.5.2.2 The brain (biology only)

Question 15 · continued

6 (b) (iii) The boy grew up and got married.

A blood test showed that his wife had also inherited the same changed HEXA gene.

There is a 1 in 4 chance that this couple's first child will have the genetic disorder.

Use a genetic diagram to explain why.

Use the following symbols in your explanation:

H = allele for making the normal HEXA enzyme
h = allele for making a HEXA enzyme that does not work.

(3 marks)

9

4.5.2.2 The brain (biology only)

Question 16

June 2015 | BL3HP | Original Q5 | Legacy

5 Many runners drink sports drinks to improve their performance in races.

A group of students investigated the effects of three brands of sports drink, **A**, **B** and **C**, on the performance of three runners on a running machine. One of the runners is shown in **Figure 4**.

Figure 4



Table 2 gives information for each drink.

Table 2

	Brand of sports drink		
Nutrient per dm^3	**A**	**B**	**C**
Glucose in g	63	31	72
Fat in g	9	0	2
Ions in mg	312	332	495

4.5.2.2 The brain (biology only)

Question 16 · continued

5 (a) (i) In the investigation, performance was measured as the time taken to reach the point of exhaustion.

Exhaustion is when the runners could not run anymore.

All three runners:
- ran on a running machine until the point of exhaustion
- each drank 500 cm^3 of a different brand of sports drink
- rested for 4 hours to recover
- ran on the running machine again and recorded how much time they ran until the point of exhaustion.

The speed at which the runners ran was the same and all other variables were controlled.

The students predicted that the runner drinking brand **B** would run for the shortest time on the second run before reaching the point of exhaustion.

Use information from **Table 2** to suggest an explanation for the students' prediction.

[2 marks]

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5 (a) (ii) If the balance between ions and water in a runner's body is not correct, the runner's body cells will be affected.

Describe **one** possible effect on the cells if the balance between ions and water is **not** correct.

[1 mark]

.....

.....

5 (b) When running, a runner's body temperature increases.

Describe how the brain monitors body temperature.

[3 marks]

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4.5.2.2 The brain (biology only)

Question 16 · continued

5 (c) (i) **Table 2** is repeated here to help you answer this question.

Table 2

	Brand of sports drink		
Nutrient per dm^3	**A**	**B**	**C**
Glucose in g	63	31	72
Fat in g	9	0	2
Ions in mg	312	332	495

People with diabetes need to be careful about drinking too much sports drink.

Use information from **Table 2** to explain why drinking too much sports drink could make people with diabetes ill.

[3 marks]

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5 (c) (ii) Other than paying attention to diet, how do people with diabetes control their diabetes?

[1 mark]

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10

4.5.2.2 The brain (biology only)

Question 17

June 2016 | BL1HP | Original Q1 | Legacy

1 Nicotine and alcohol are drugs that affect the brain.

1 (a) (i) What is the correct description of both nicotine and alcohol?

[1 mark]

Tick (✓) **one** box.

- illegal, medical drugs ☐
- illegal, recreational drugs ☐
- legal, medical drugs ☐
- legal, recreational drugs ☐

1 (a) (ii) Why do people find it difficult to stop smoking?

[1 mark]

_____

_____

1 (b) A drug company has developed a new drug which helps people to stop smoking.
The new drug prevents the feeling of pleasure caused by nicotine in the smoke.

The new drug is now being tested on rats which have been given a lot of alcohol to drink.
The company wants to find out if the drug can help people to stop drinking alcohol.

1 (b) (i) It is important that the tests on rats are done by an independent company.

What is meant by an independent company?

[1 mark]

_____

_____

4.5.2.2 The brain (biology only)

Question 17 · continued

1 (b) (ii) Why is it important that the tests are done by an independent company?

[1 mark]

1 (b) (iii) Some scientists believe that the part of the brain sensitive to alcohol is the same as the part of the brain sensitive to nicotine.

Explain why the new drug might be useful for treating people who find it difficult to stop drinking alcohol.

[2 marks]

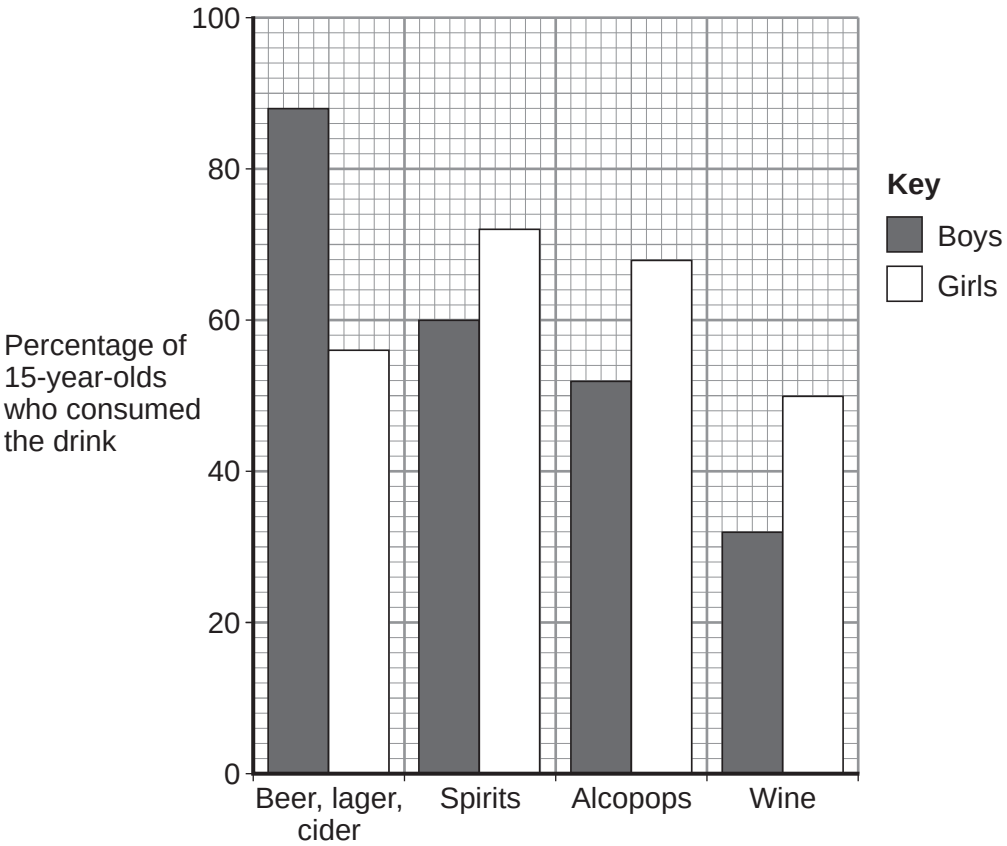
Question 1 continues on the next page

4.5.2.2 The brain (biology only)

Question 17 · continued

1 (c) **Figure 1** shows the results of a survey into the different types of alcoholic drinks consumed by one hundred 15-year-old boys and one hundred 15-year-old girls in the UK.

Figure 1



1 (c) (i) Describe the differences between the **types** of alcoholic drink consumed by boys and by girls.

Use **only** information from **Figure 1**.

[2 marks]

1 (c) (ii) A newspaper headline stated:

"All boys drink alcohol"

Use information from part **(c)** and **Figure 1** to give **one** reason why the newspaper headline may **not** be correct.

[1 mark]

9

4.5.2.2 The brain (biology only)

Question 18

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]

4.5.2.2 The brain (biology only)

Question 18 · 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

4.5.2.2 The brain (biology only)

Question 19

June 2016 | BL3HP | Original Q7 | Legacy

7 Humans keep their internal conditions almost constant.

Body temperature is kept within a narrow range.

When the core body temperature is too low, this is detected by the thermoregulatory centre in the brain.

Describe how the body responds when a decrease in core body temperature is detected.

[6 marks]

6

4.5.2.2 The brain (biology only)

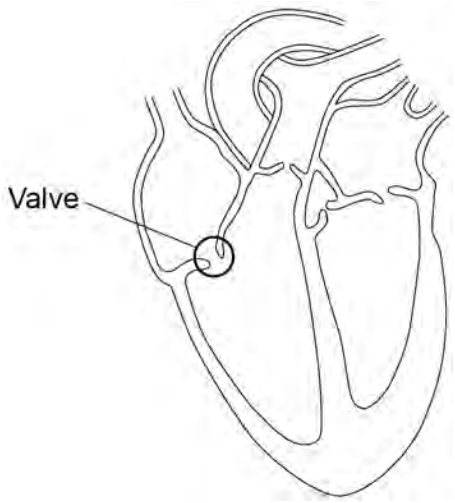
Question 20

June 2019 | 8461/1H | Original Q5

0 5 **Figure 6** shows the internal structure of the human heart.

One of the heart valves is labelled.

Figure 6



Sometimes a valve in the heart can start to leak.

0 5 . 1 Explain why a person with a leaking heart valve has difficulty exercising.

[4 marks]

Question 20 · continued

A patient with a leaking heart valve may have the valve replaced.

A study compared two different types of replacement heart valve:

- mechanical valves
- biological valves from pigs.

The data used in the study was collected from female patients aged 50–69.

Table 4 shows the data.

Table 4

	Type of replacement heart valve	
	Mechanical	**Biological**
Number of patients given the valve	2852	1754
Number of patients who died from heart-related problems after valve replacement	180	178
Percentage of patients alive after 5 years	91	89
Percentage of patients needing a second valve replacement within 6 years	2.2	5.2
Percentage of patients who had a blood clot on the brain after surgery	5.8	0.1

0 5 . 2 Give **one** conclusion about the death of patients from heart-related problems after a valve replacement.

Include calculations to support your answer.

[3 marks]

4.5.2.2 The brain (biology only)

Question 20 · continued

0 5 . 3 One risk of mechanical valves is that blood clots can form on the surface of the valve.

Name the component of the blood that starts the process of blood clotting.

[1 mark]

0 5 . 4 Evaluate the use of mechanical replacement heart valves and biological replacement heart valves.

Use information from **Table 4** and your own knowledge.

[6 marks]

14

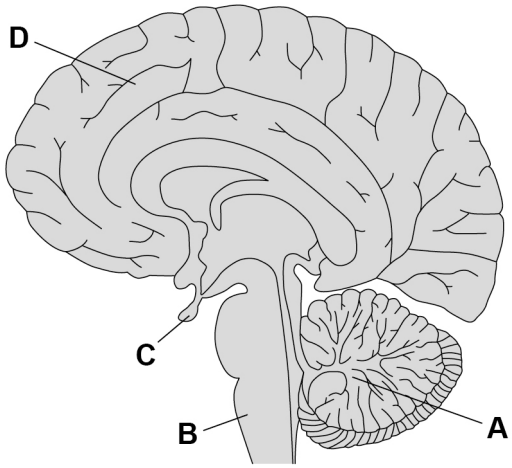
4.5.2.2 The brain (biology only)

Question 21

November 2020 | 8461/2H | Original Q6

0 6 **Figure 7** shows the brain.

Figure 7



0 6 . 1 Which part of the brain becomes more active if a person balances on one leg instead of standing on two legs?

[1 mark]

Tick (✓) **one** box.

A ☐ **B** ☐ **C** ☐ **D** ☐

0 6 . 2 Name the part of the brain that is responsible for making a decision.

[1 mark]

_____

4.5.2.2 The brain (biology only)

Question 21 · continued

0 6 . 3 In most MRI scanners the person being scanned needs to stay completely still.

A functional MRI (fMRI) scanner allows a person to move while the scanner makes images of the person's brain activity.

Suggest how the fMRI scanner could help to find out more about the brain damage a person has.

[3 marks]

0 6 . 4 Describe how the brain receives information about light entering the eye.

You should include the names of structures in your answer.

[3 marks]

Question 6 continues on the next page

4.5.2.2 The brain (biology only)

Question 21 · continued

0 6 . 5 The eyes of some birds contain cells that detect ultraviolet (UV) light.

UV light is reflected by some fruits and the urine of small mammals.

Explain how birds that detect UV light have evolved from birds that could not detect UV light.

[6 marks]

14

4.5.2.2 The brain (biology only)

Question 22

November 2021 | 8461/2H | Original Q3

0 3 Human body temperature is controlled within very narrow limits.

Scientists investigated the effect of drinking ice-cold water on:

- internal body temperature
- the rate of sweating.

This is the method used.

1. Sit a person inside a room kept at a constant temperature of 25 °C.
2. Measure the person's internal body temperature near the brain.
3. Measure the person's rate of sweating.
4. After 20 minutes, give the person 500 cm^3 of ice-cold water to drink.
5. Continue to measure the person's internal body temperature and sweating rate for a further 50 minutes.

0 3 . 1 Give the reason why the person should **not** move during the investigation.

[1 mark]

Question 3 continues on the next page

4.5.2.2 The brain (biology only)

Question 22 · continued

Figure 5 and **Figure 6** show the scientists' results.

Figure 5

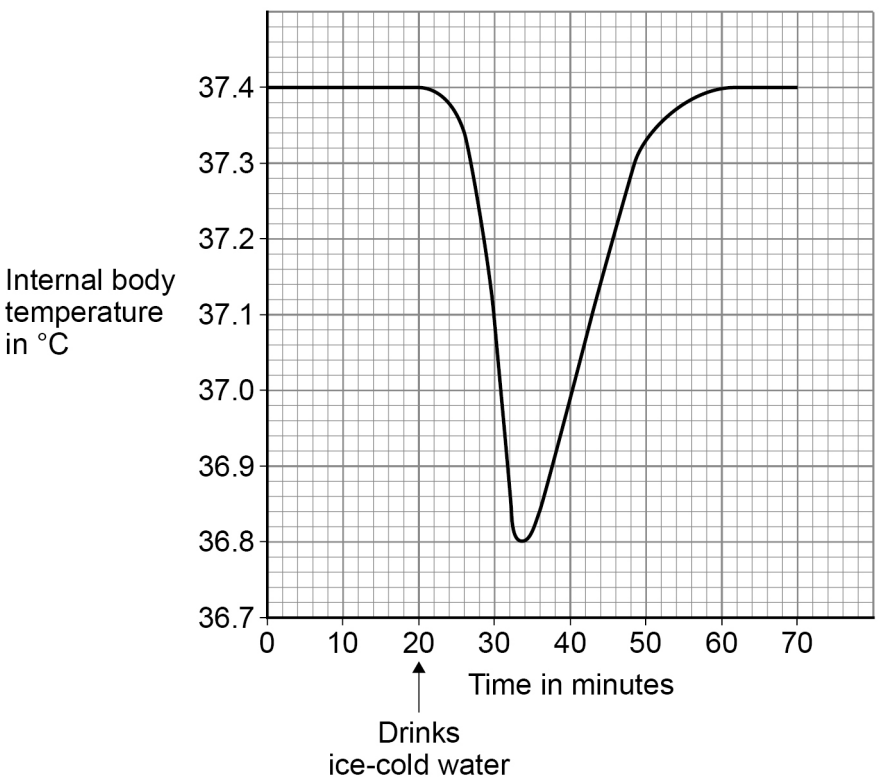
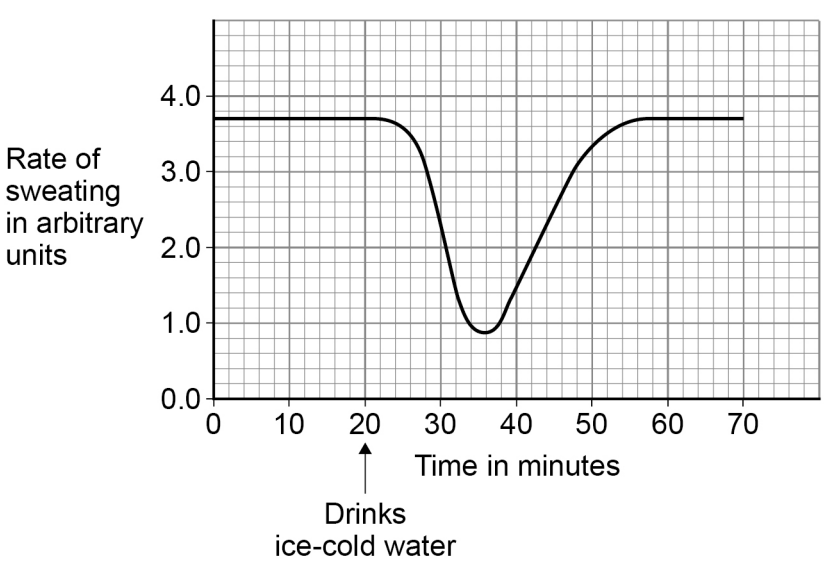


Figure 6



4.5.2.2 The brain (biology only)

Question 22 · continued

0 3 . 2 What is this person's normal internal body temperature?

[1 mark]

Tick (✓) **one** box.

36.8 °C ☐ 37.0 °C ☐ 37.4 °C ☐

The results show that when the ice-cold water was drunk, the temperature near the brain decreased.

0 3 . 3 Explain why the temperature near the brain decreased.

[2 marks]

0 3 . 4 The thermoregulatory centre in the brain responds to the decrease in temperature.

How does the thermoregulatory centre send information to sweat glands in the skin?

[1 mark]

0 3 . 5 The rate of sweating changes between 24 minutes and 36 minutes.

Explain how this change helps to maintain the person's normal body temperature.

[2 marks]

Question 3 continues on the next page

4.5.2.2 The brain (biology only)

Question 22 · continued

0 3 . 6 During exercise, the skin appears red.

What causes the skin to appear red?

[1 mark]

Tick (✓) **one** box.

- Blood vessels moving closer to the skin surface ☐
- Constriction of blood vessels in the skin ☐
- Decrease in heart rate ☐
- Dilation of blood vessels in the skin ☐

8

Turn over for the next question