AQA GCSE Biology | 8461

SPECIFICATION POINT 4.5.2.4

Control of body temperature (biology only)

Past-paper questions

Tier	**Foundation**
Question groups	**30**
Available paper years	**2008–2025**

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.

4.5.2.4 Control of body temperature (biology only)

Question 01

January 2008 | BLY1F | Original Q3 | Legacy

3 (a) Use words from the box to complete the sentences about controlling conditions in our bodies.

kidneys	**liver**	**lungs**	**skin**

(i) When we breathe out, water leaves the .....

(1 mark)

(ii) When we sweat, water leaves the body through the .....

(1 mark)

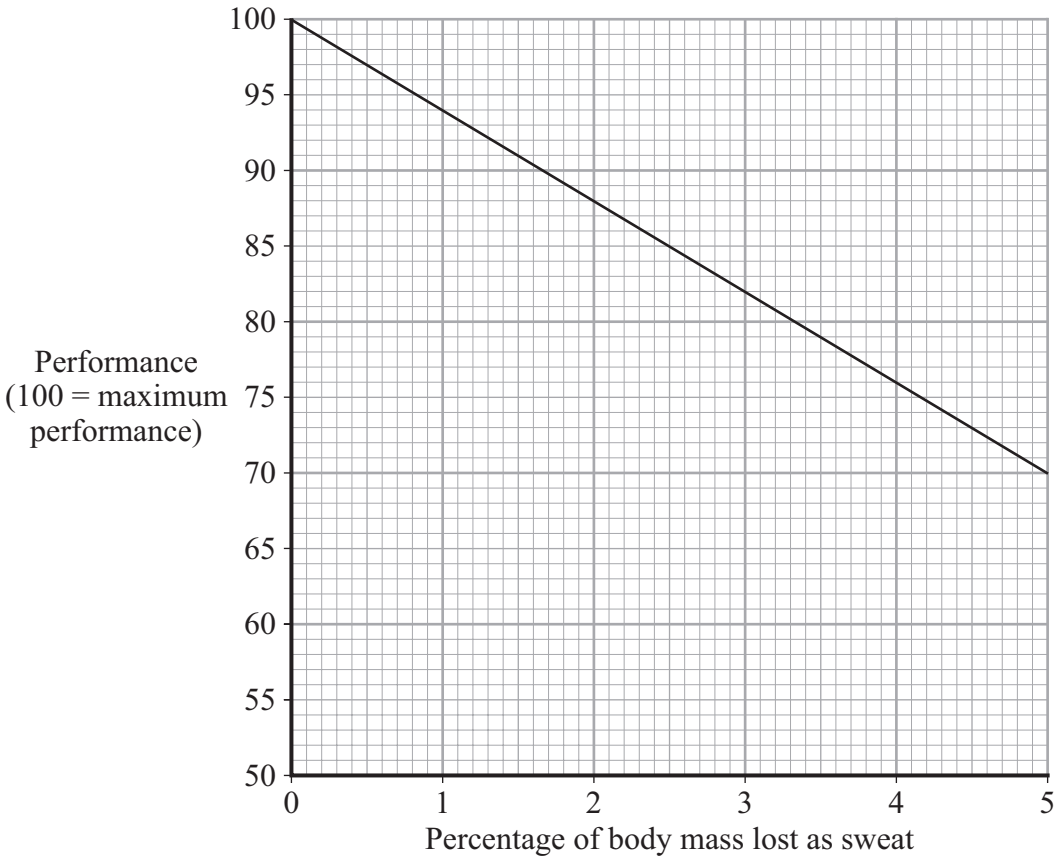
(iii) Excess water leaves the body in a liquid called urine.

Urine is produced by the ..... .

(1 mark)

(b) We lose a lot of sweat during exercise. When this happens, we cannot perform as well as we could at the start of the exercise.

The graph shows the effect of losing sweat on the performance of an athlete.



4.5.2.4 Control of body temperature (biology only)

Question 01 · continued

BLANK

(i) Describe the effect of losing sweat on performance.

.....

.....

(1 mark)

(ii) How can athletes reduce this effect on performance?

.....

.....

(1 mark)

5

Turn over for the next question

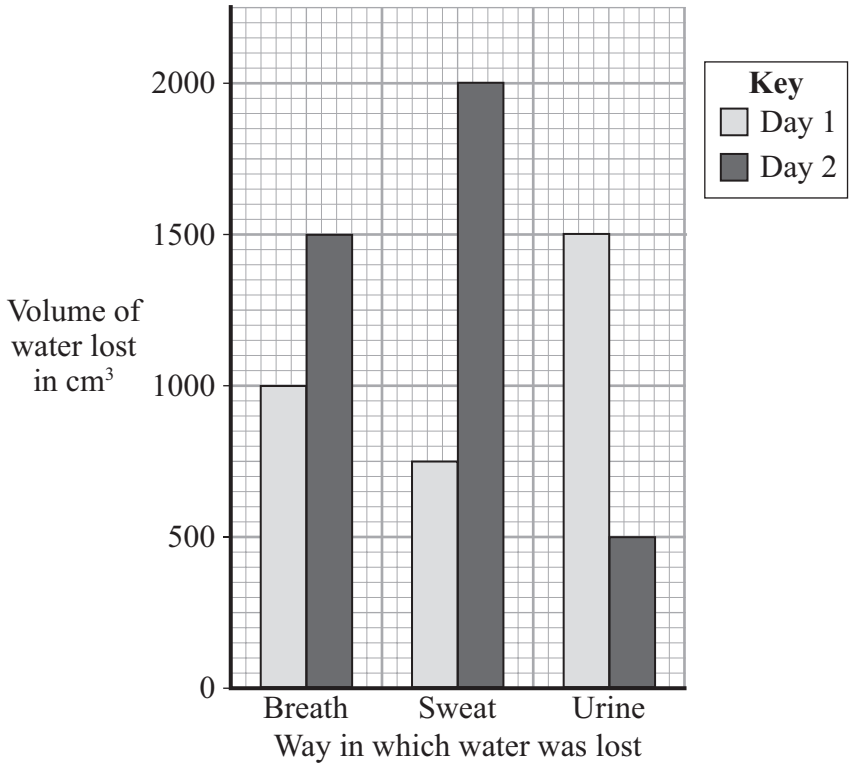
4.5.2.4 Control of body temperature (biology only)

Question 02

January 2008 | BLY2F | Original Q2 | Legacy

2 The bar chart shows the amount of water lost from the body of a student on two different days.

The student ate the same amount of food and drank the same amount of liquid on the two days. The temperature of the surroundings was similar on the two days.



(a) The total volume of water lost on day 1 was 3250 cm^3.

How much water was lost on day 2? Show all your working.

.....

..... cm^3

(2 marks)

(b) The student did much more exercise on one of the days than on the other.

On which day did he do more exercise? Day .....

Give **two** reasons for your answer.

1 .....

.....

2 .....

.....

(2 marks)

4.5.2.4 Control of body temperature (biology only)

Question 02 · continued

BLANK

(c) (i) Which **one** of these is a chemical reaction that produces water in the body?

Put a tick (✓) in the box next to your choice.

Breathing ☐

Osmosis ☐

Respiration ☐

Sweating ☐

(1 mark)

(ii) How does sweating help the body?

.....

.....

(1 mark)

(iii) If the body loses more water than it gains, it becomes dehydrated.
The concentration of the solution surrounding the body cells increases.
This causes the cells to lose water.

By which process do cells lose water?

Put a tick (✓) in the box next to your choice.

Breathing ☐

Osmosis ☐

Respiration ☐

Sweating ☐

(1 mark)

7

4.5.2.4 Control of body temperature (biology only)

Question 03

June 2008 | BLY1AP | Original Q2 | Legacy

QUESTION TWO

Different organs produce different substances.

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

A skin

B liver

C kidney

D gland

1	produces urine
2	produces hormones
3	produces sweat
4	produces cholesterol

4.5.2.4 Control of body temperature (biology only)

Question 04

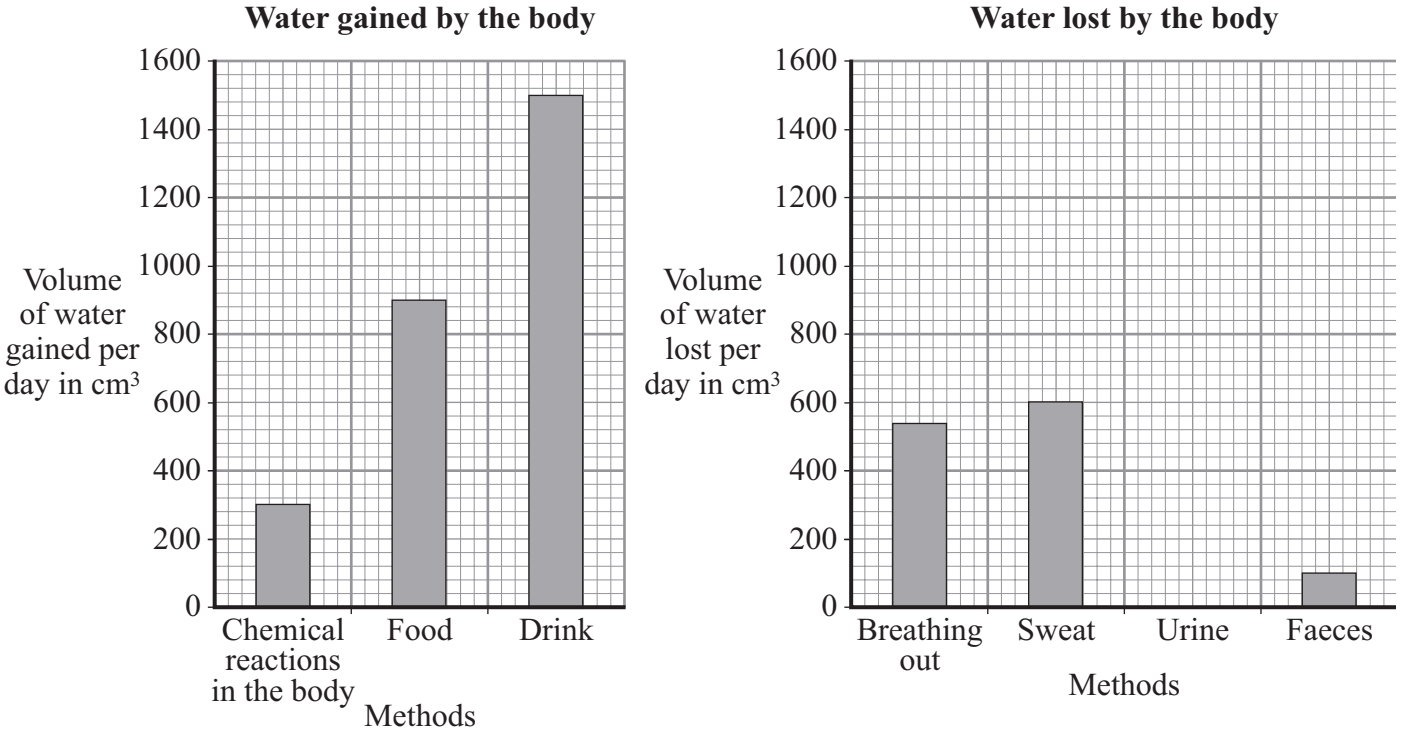
June 2008 | BLY1AP | Original Q5 | Legacy

QUESTION FIVE

This question is about the water balance of the body.

The volume of water gained by the body must be the same as the volume of water lost by the body over the same time.

The bar charts show the volume of water gained and the volume of water lost per day.



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

A 540 cm^3

B 1460 cm^3

C 1500 cm^3

D 2700 cm^3

1	the volume of water gained in drinks
2	the total volume of water gained
3	the volume of water lost by breathing out
4	the volume of water that would be lost in the urine to balance the water gained by the body with the water lost

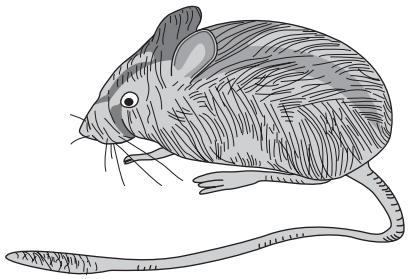
4.5.2.4 Control of body temperature (biology only)

Question 05

June 2008 | BLY1F | Original Q2 | Legacy

2 The drawing shows a kangaroo rat.

This rat lives in hot, dry deserts.



2 (a) Explain how each of the following features helps the kangaroo rat to survive in a hot, dry desert.

2 (a) (i) It does not produce urine.

.....

.....

(1 mark)

2 (a) (ii) It lives in a burrow during the day, but comes out at night to search for food.

.....

.....

(1 mark)

2 (a) (iii) Its feet and its tail each have a large surface area.

.....

.....

(1 mark)

4.5.2.4 Control of body temperature (biology only)

Question 05 · continued

for mark

2 (b) The kangaroo rat does **not** sweat.

Explain why **not** sweating could be dangerous for the animal.

.....

.....

(1 mark)

4

Turn over for the next question

4.5.2.4 Control of body temperature (biology only)

Question 06

June 2008 | BLY2F | Original Q4 | Legacy

4 The volume of water that the body loses must balance the volume of water that it gains.

Tables 1 and **2** show losses and gains of water by the body in one day.

Table 1
Losses of water by the body

Method	Volume in cm^3
breathing	300
sweating	600
faeces	100
urine	
Total	**2400**

Table 2
Gains of water by the body

Method	Volume in cm^3
drinking	1300
food	800
chemical reactions	300
Total	**2400**

4 (a) (i) Calculate the volume of urine lost by the body.

Show clearly how you work out your answer.

.....

.....

Volume of urine lost by the body = ... cm^3

(2 marks)

4 (a) (ii) What proportion of water gained by the body comes from food?

Put a tick (✓) in the box next to your choice.

$\frac{1}{4}$ ☐

$\frac{1}{3}$ ☐

$\frac{1}{2}$ ☐

(1 mark)

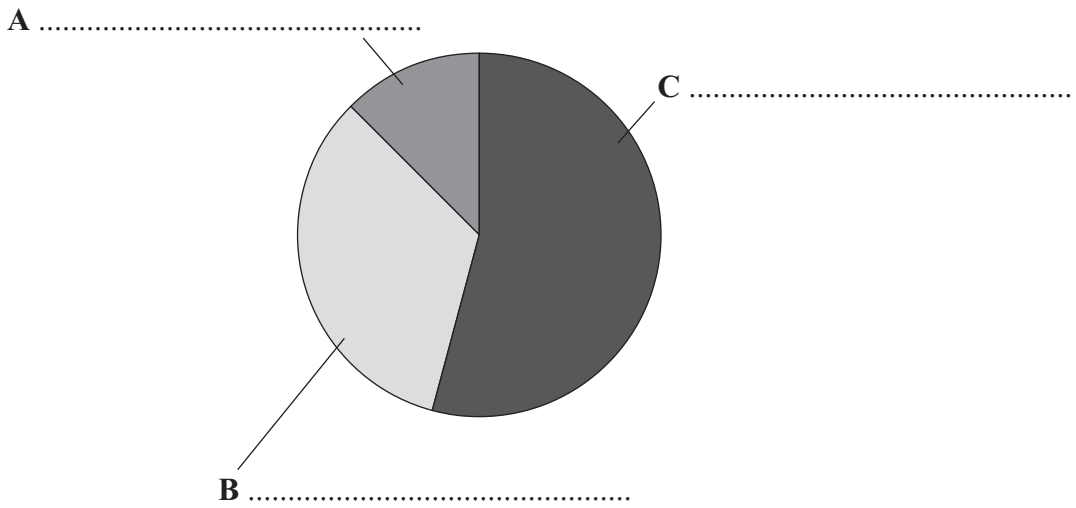
4.5.2.4 Control of body temperature (biology only)

Question 06 · continued

for mark

4 (b) One pupil decided to show the figures from **Table 2** as a pie chart.

Label sections **A**, **B** and **C** of the pie chart.



(1 mark)

4 (c) How does sweating help the body?

.....

.....

(1 mark)

4 (d) On a hotter day, the volumes of water lost and gained will be different.

What differences will there be?

Tick (✓) **two** answers from the list.

More sweat produced ☐

More faeces produced ☐

More food eaten ☐

Less urine produced ☐

Less liquid drunk ☐

(2 marks)

7

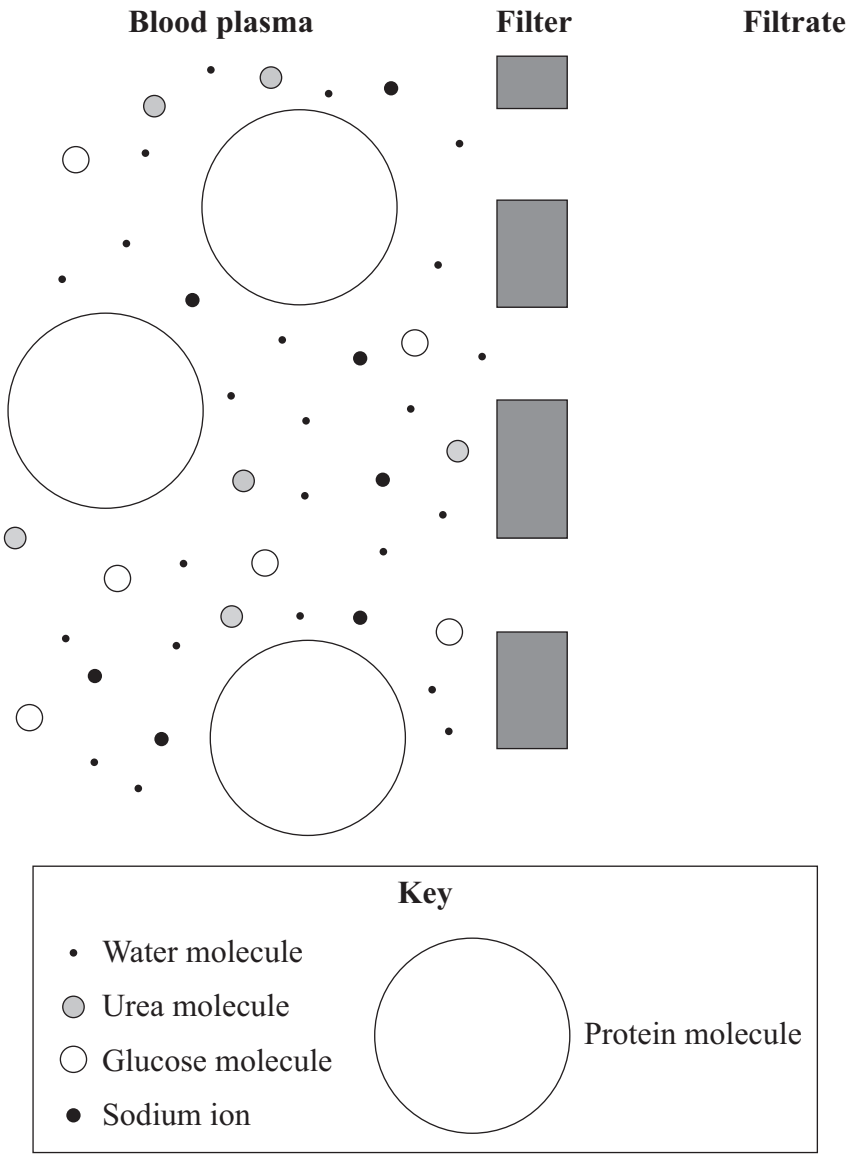
4.5.2.4 Control of body temperature (biology only)

Question 07

June 2008 | BLY3F | Original Q2 | Legacy

2 The kidneys filter the blood.

The diagram shows the site of filtration in the kidney.



4.5.2.4 Control of body temperature (biology only)

Question 07 · continued

for mark

2 (a) Use information from the diagram to answer this question.

Put a tick (✓) in the box next to every substance that will pass through the filter from the blood plasma into the filtrate.

One has been done for you.

glucose	✓
urea	
water	
sodium ions	
protein	

(2 marks)

2 (b) Proteins and glucose are not present in the urine of a healthy person.

2 (b) (i) Use information from the diagram to explain why protein is not found in the urine of a healthy person.

.....

.....

(1 mark)

2 (b) (ii) Complete the sentence by drawing a ring around the correct answer.

After filtration, all the glucose is

reabsorbed
released
respired

.

(1 mark)

Question 2 continues on the next page

4.5.2.4 Control of body temperature (biology only)

Question 07 · continued

for mark

2 (c) An athlete trained on a hot day and on a cold day. On each day, he did the same amount of exercise and drank the same volume of water.

Complete the sentences by drawing a ring around the correct answer.

2 (c) (i) On the hot day, the athlete would produce [less / more / the same amount of] urine.

(1 mark)

2 (c) (ii) This is because he would produce [less / more / the same amount of] sweat.

(1 mark)

6

4.5.2.4 Control of body temperature (biology only)

Question 08

November 2008 | BLY1AP | Original Q3 | Legacy

QUESTION THREE

Different human organs have different functions.

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

A produces cholesterol

B produces sweat

C produces urine

D produces hormones

1	pituitary gland
2	liver
3	skin
4	kidney

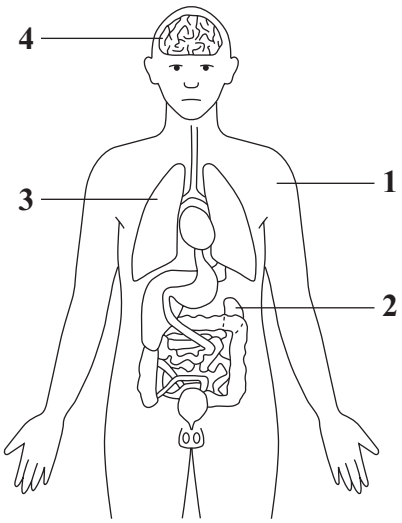
4.5.2.4 Control of body temperature (biology only)

Question 09

March 2009 | BLY1AP | Original Q1 | Legacy

QUESTION ONE

The diagram shows some of the organs which help to keep conditions inside the human body constant.



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

A the skin, which produces sweat

B a lung, which breathes out carbon dioxide

C the brain, which coordinates the other organs

D the kidney, which produces urine

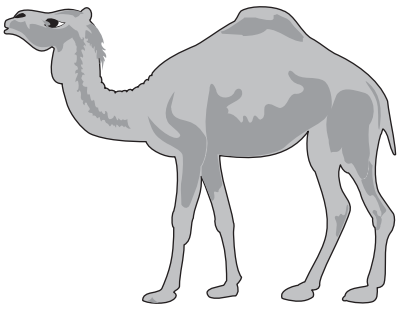
4.5.2.4 Control of body temperature (biology only)

Question 10

March 2009 | BLY1BP | Original Q2 | Legacy

QUESTION TWO

Camels are adapted for living in hot, dry conditions.



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

A The camel's stomach can hold 200 litres of water.

B The camel produces little urine and does not sweat.

C Camels store fat in a hump.

D Camels can withstand an increase in body temperature of 9 °C without harm.

1	Camels lose very little water each day.
2	It is unlikely for a camel to die from being overheated.
3	Camels can go without drinking water for several days.
4	Camels can go without food for several days.

4.5.2.4 Control of body temperature (biology only)

Question 11

June 2009 | BLY1AP | Original Q3 | Legacy

QUESTION THREE

Water leaves your body from several organs.

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

A glands

B kidneys

C lungs

D skin

When you breathe out, water vapour leaves your . . . **1** . . . .

When you sweat, water leaves the surface of your . . . **2** . . . .

Water is lost in urine produced by the . . . **3** . . . .

The total amount of water lost from the body is controlled by hormones.

Hormones are produced by . . . **4** . . . .

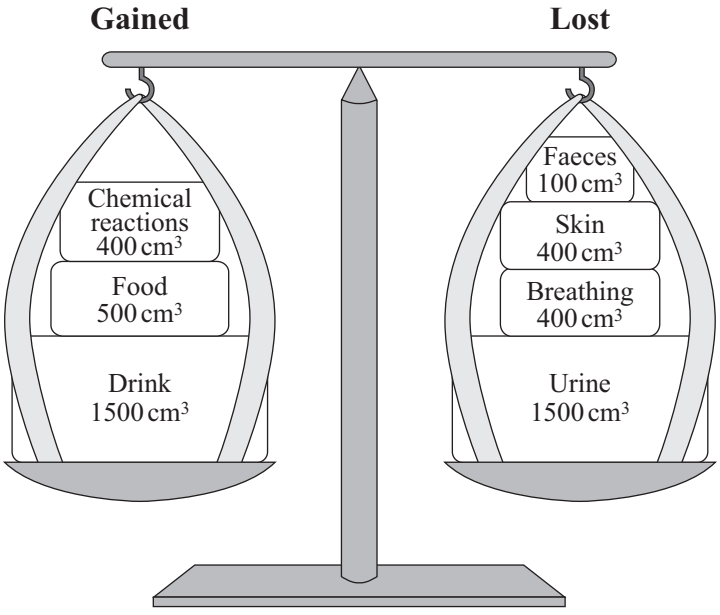
4.5.2.4 Control of body temperature (biology only)

Question 12

November 2009 | BLY1AP | Original Q2 | Legacy

QUESTION TWO

The diagram represents water balance in the body.



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

A 100

B 400

C 900

D 2400

	Volume of water in cm^3
1	volume of water lost in the faeces
2	total volume of water gained
3	total volume of water gained from food and chemical reactions in the body
4	volume of water lost by sweating

4.5.2.4 Control of body temperature (biology only)

Question 13

November 2009 | BLY1BP | Original Q7 | Legacy

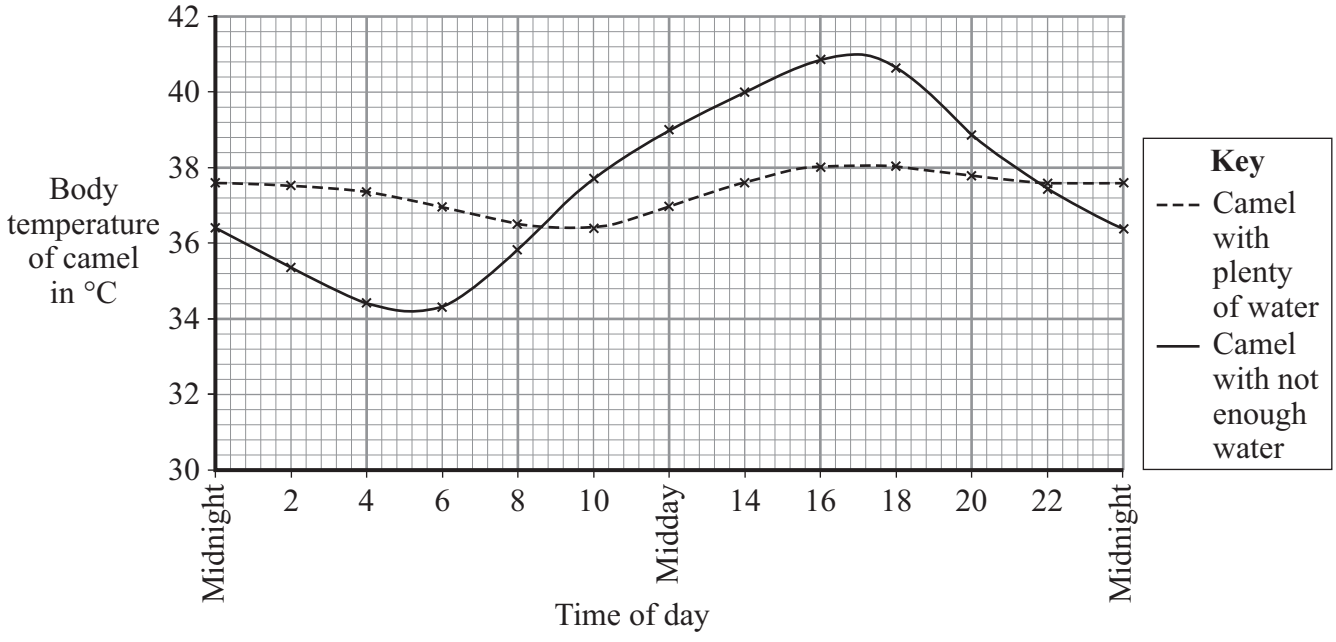
QUESTION SEVEN

Camels live in the desert and are adapted to cope with dry conditions and high temperatures.

A scientist investigated the hypothesis that a camel that drinks lots of water can control its body temperature better than a camel that drinks little water.

- He measured the body temperatures of two camels during the same day.
- One camel did not have enough water to drink and the other had plenty of water available.
- The camels had the same living conditions.

The results are shown in the graph.



7A What was the maximum body temperature of the camel with not enough water?

1 34.2 °C

2 36.5 °C

3 38.2 °C

4 41.0 °C

4.5.2.4 Control of body temperature (biology only)

Question 13 · continued

7B In this investigation, the camel with not enough water was a suitable control because . . .

1 water for the camel is essential to life.

2 the comparison shows that camels can keep their body temperature similar in certain conditions.

3 all species of animal can control their body temperatures.

4 the only difference between the two camels was the availability of water.

7C The reliability of the data could be improved by . . .

1 taking more temperature readings during the day.

2 taking more temperature readings from different camels but under the same conditions.

3 using a more accurate thermometer.

4 using a spreadsheet to record and analyse the data.

7D The body temperature of the camel with plenty of water (hydrated) varied less than that of the camel with not enough water (dehydrated) because . . .

1 the dehydrated camel had less water in its body to heat up or cool down.

2 the hydrated camel was able to sweat more to cool it down.

3 the hydrated camel was always in the shade near a water supply.

4 the Sun could not get to the hydrated camel as easily as to the dehydrated camel.

4.5.2.4 Control of body temperature (biology only)

Question 14

January 2010 | BLY2F | Original Q1 | Legacy

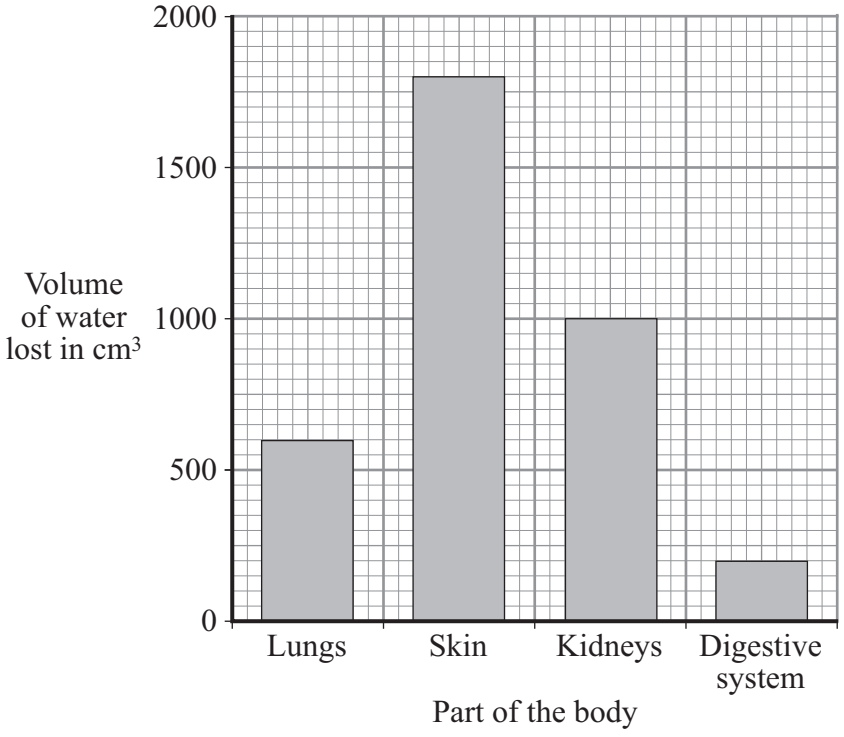
1 Water is lost from several parts of the body.

1 (a) Draw **one** line from each body part to the substance in which water is lost.

Body Part	Substance
Kidneys	Urine
Lungs	Faeces
Skin	Sweat
	Breath

(3 marks)

1 (b) The bar chart shows the volume of water a person lost from different parts of the body during a warm day.



4.5.2.4 Control of body temperature (biology only)

Question 14 · continued

for mark

1 (b) (i) What volume of water was lost through the skin on the warm day?

Tick (✓) **one** box.

600 cm^3 ☐

1600 cm^3 ☐

1800 cm^3 ☐

(1 mark)

1 (b) (ii) What effect would colder weather have on the amount of water lost through the skin?

Draw a ring around your answer.

decreases **increases** **stays the same**

(1 mark)

1 (b) (iii) Give a reason for your answer.

.....

.....

(1 mark)

1 (c) What effect does cold weather generally have on the amount of urine produced?

Draw a ring around your answer.

decreases **increases** **stays the same**

(1 mark)

7

4.5.2.4 Control of body temperature (biology only)

Question 15

March 2010 | BLY1AP | Original Q5 | Legacy

QUESTION FIVE

Most long-distance runners drink sports drinks during a race.

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

A energy

B enzymes

C mass

D sweat

Ions and water are lost during a race in . . . **1** . . . .

Sugar is added to sports drinks to replace the sugar used to release . . . **2** . . . .

In hot conditions, the athlete's body temperature may rise. This affects the working of . . . **3** . . . .

An athlete who drinks too much water during a race will probably gain . . . **4** . . . .

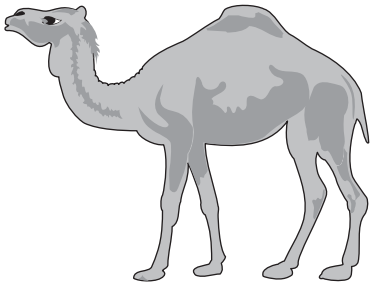
4.5.2.4 Control of body temperature (biology only)

Question 16

November 2010 | BLY1BP | Original Q5 | Legacy

QUESTION FIVE

Camels live in deserts. Deserts are dry and hot in the day, but can be very cold at night. Camels have adaptations. These adaptations help camels to survive in desert conditions.



Match desert conditions, **A**, **B**, **C** and **D**, with the adaptations **1–4** in the table.

A the wind blows sand around

B very cold nights

C soft ground

D dry conditions

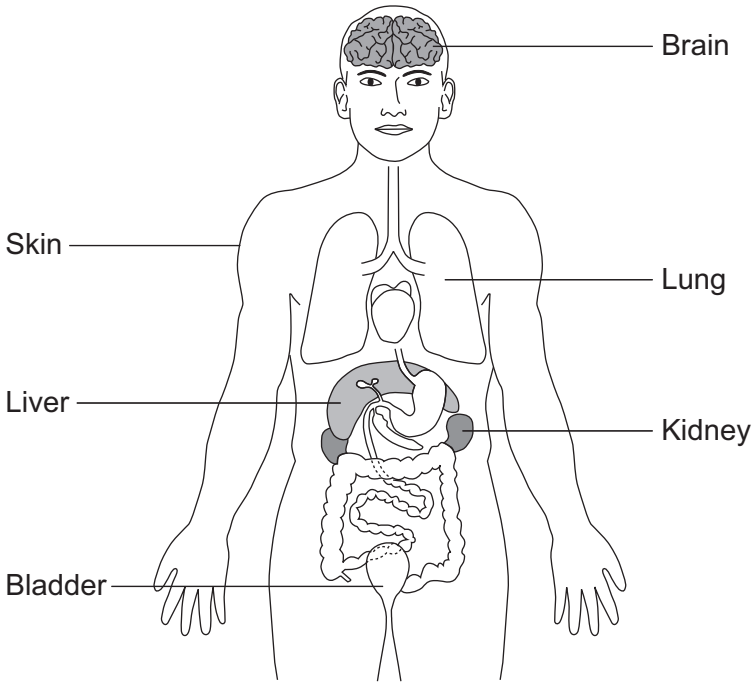
	Adaptation
1	camels produce very little sweat
2	camels have feet with a large surface area
3	camels can shut their nostrils
4	camels have thick fur to trap air

4.5.2.4 Control of body temperature (biology only)

Question 17

January 2011 | BLY2F | Original Q2 | Legacy

2 (a) The diagram shows organs which help to control conditions inside the body.



Draw a ring around the correct answer to complete each sentence.

2 (a) (i) Carbon dioxide is removed from the body by the

kidney.
lung.
skin.

(1 mark)

2 (a) (ii) Urine is made in the

kidney.
lung.
skin.

(1 mark)

2 (a) (iii) Urine is stored in the

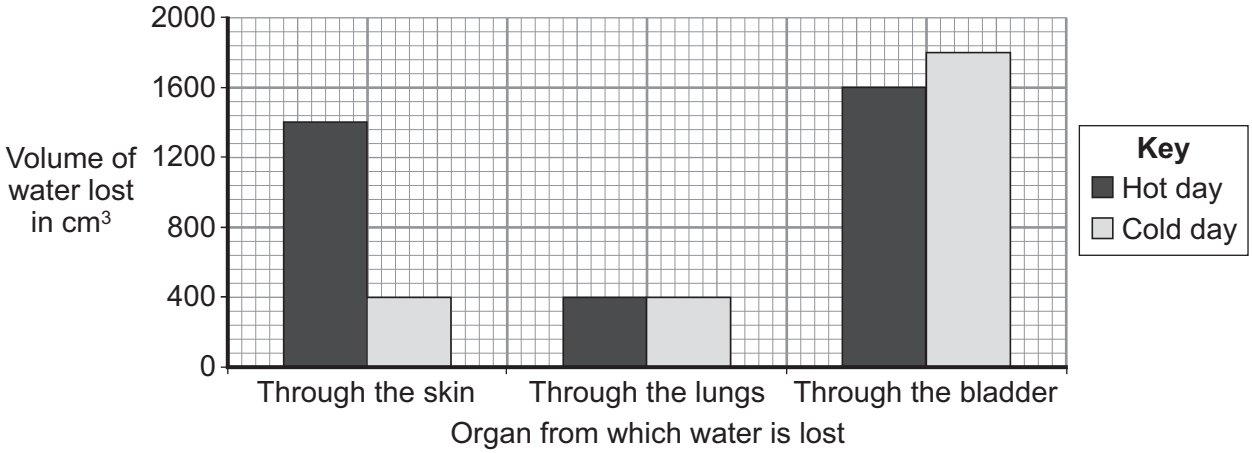
bladder.
liver.
skin.

(1 mark)

4.5.2.4 Control of body temperature (biology only)

Question 17 · continued

2 (b) The bar chart shows the volume of water lost from different organs of the body. The information is shown for a hot day and for a cold day.



2 (b) (i) Look at the bar chart.

How does the volume of water lost on the hot day compare with the volume of water lost on the cold day for each organ?

Complete the table using words from the box.

the same	**less**	**more**

Organ	Volume of water lost on a hot day compared with volume of water lost on a cold day
Skin	
Lungs	
Bladder	

(3 marks)

2 (b) (ii) In total, more water is lost on the hot day than on the cold day.

How does the increase in the volume of water lost on the hot day help to control the body temperature?

.....

.....

(1 mark)

7

4.5.2.4 Control of body temperature (biology only)

Question 18

March 2011 | BLY1AP | Original Q5 | Legacy

QUESTION FIVE

We control conditions inside our bodies.

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

A liver

B pituitary gland

C kidney

D skin

1	produces the hormone FSH
2	gets rid of excess heat
3	removes excess water from the blood
4	produces cholesterol

4.5.2.4 Control of body temperature (biology only)

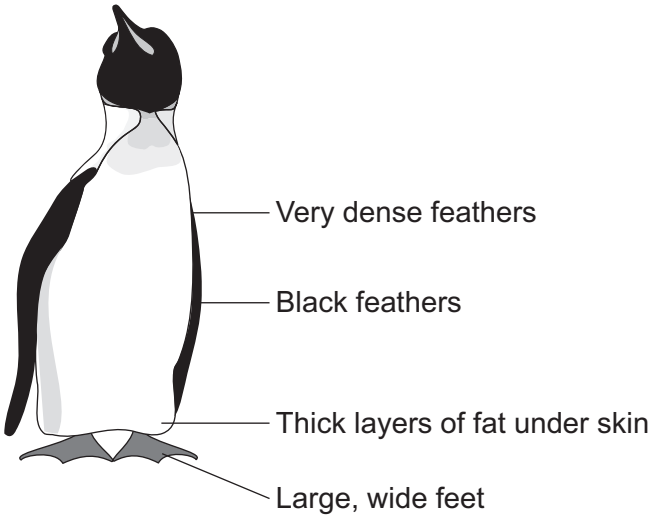
Question 19

June 2011 | BLY1BP | Original Q6 | Legacy

QUESTION SIX

The Antarctic is a very cold environment, with temperatures often colder than −40 °C.

The picture shows an Emperor penguin.



6A Which feature does **not** help the Emperor penguin to keep its body temperature constant in cold conditions?

1 large, wide feet

2 thick layers of fat

3 black feathers

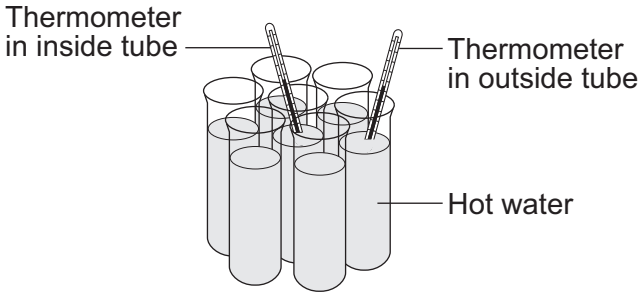
4 very dense feathers

4.5.2.4 Control of body temperature (biology only)

Question 19 · continued

June 2011 | BLY1BP | Original Q6 | Legacy

Penguins are often seen huddling together. A group of students did an investigation to find out if huddling helps to keep animals warm. The students put hot water into each of seven large test tubes. The students recorded the temperature of the water in two of the tubes every minute for 10 minutes.



6B Which would be the best experimental control for this investigation?

1 repeating the investigation to check the results

2 recording the temperature of water in a tube left on its own

3 measuring the temperature of real penguins in a huddle

4 moving the tubes around every two minutes

The table shows the data collected by the students.

Time in minutes	Temperature of water in inside tube in °C	Temperature of water in outside tube in °C
0	75	74
10	68	49

6C To collect data for a line graph, the students should . . .

1 collect results for more than 10 minutes.

2 make sure that the water in the tubes was at the same temperature at the start.

3 collect results more often during the 10 minutes.

4 use a thermometer that measures to greater precision.

6D The students looked at their results and wrote a conclusion.

Which is the best conclusion based on the results?

1 Penguins on the outside of a huddle will be warmer than penguins on the inside.

2 Penguins on the inside of the huddle will be warmer than penguins on the outside.

3 Penguins on their own would stay warmer than penguins in a huddle.

4 Penguins always cool down at the same rate.

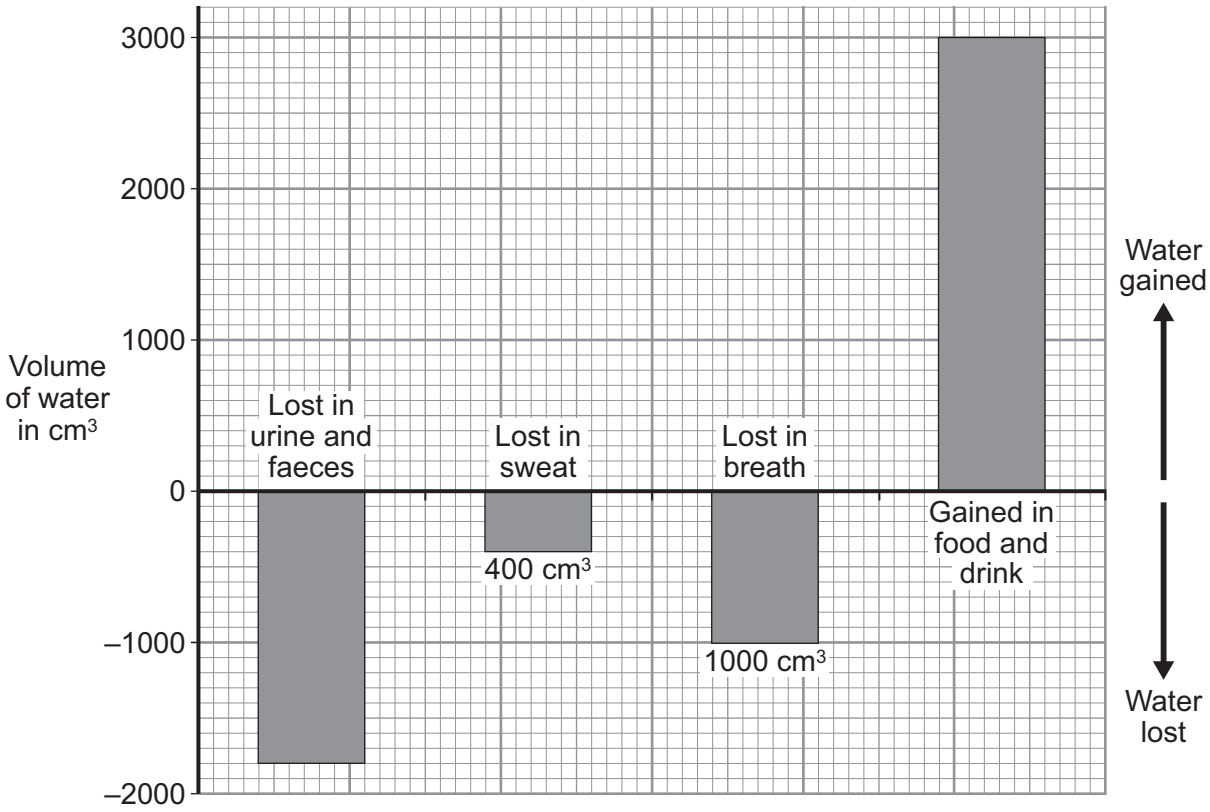
4.5.2.4 Control of body temperature (biology only)

Question 20

June 2011 | BLY2F | Original Q6 | Legacy

6 The bar chart shows different ways in which water is lost from and gained by the body on one day.

The volumes of water lost in the sweat and in the breath are labelled on the bars.



6 (a) How much water was lost in the urine and faeces? ..... cm^3

(1 mark)

6 (b) Water is lost from the body in urine, faeces, sweat and breath.

What was the total volume of water lost from the body on this day?

Show clearly how you work out your answer.

.....

.....

Answer = ... cm^3

(2 marks)

4.5.2.4 Control of body temperature (biology only)

Question 20 · continued

6 (c) The volume of water lost should balance the volume of water gained.

What should the person do to balance the water gained with the water lost?

.....

.....

.....

.....

(2 marks)

5

Turn over for the next question

4.5.2.4 Control of body temperature (biology only)

Question 21

January 2013 | BL1FP | Original Q2 | Legacy

2 The body controls internal conditions.

2 (a) Use words from the box to complete the sentences about water loss from the body.

kidneys	**liver**	**lungs**	**skin**

2 (a) (i) Water is lost in sweat via the ..... .

(1 mark)

2 (a) (ii) Water is lost in urine via the ..... .

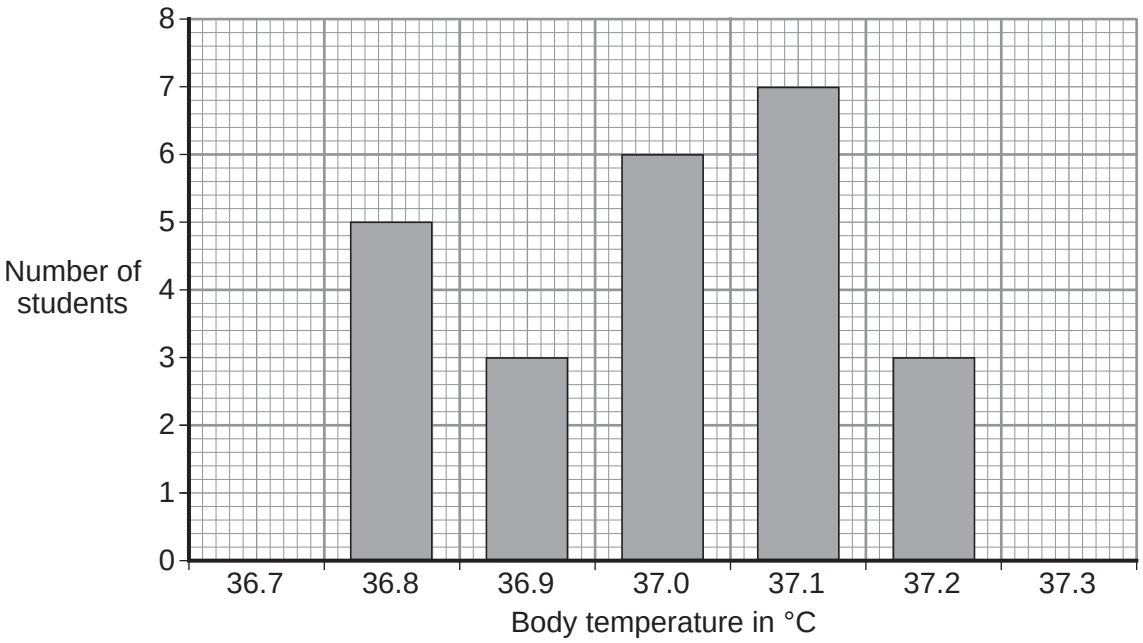
(1 mark)

2 (a) (iii) Water is lost in the breath via the ..... .

(1 mark)

2 (b) Students investigated body temperature in the class.

The bar chart shows the results.



4.5.2.4 Control of body temperature (biology only)

Question 21 · continued

2 (b) (i) One student used the bar chart to calculate the mean body temperature of the class. The student calculated the mean body temperature as 37.0 °C.

How did the student use the bar chart to calculate the mean?

.....

.....

.....

.....

(2 marks)

2 (b) (ii) How many students had a body temperature higher than the mean of 37.0 °C?

.....

(1 mark)

2 (b) (iii) Body temperature must be kept within a narrow range.

Why?

.....

.....

(1 mark)

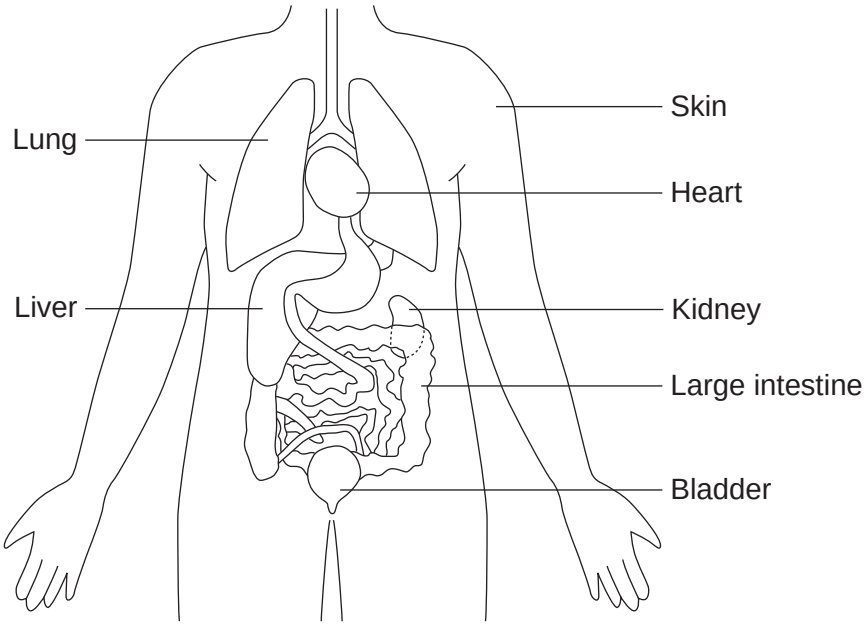
7

4.5.2.4 Control of body temperature (biology only)

Question 22

June 2013 | BL3FP | Original Q3 | Legacy

3 The diagram shows some of the organs of the human body.



3 (a) Which organ labelled on the diagram:

3 (a) (i) produces urine .....

(1 mark)

3 (a) (ii) stores urine .....

(1 mark)

3 (a) (iii) produces urea .....

(1 mark)

3 (a) (iv) gets rid of carbon dioxide .....

(1 mark)

3 (a) (v) helps to control body temperature? .....

(1 mark)

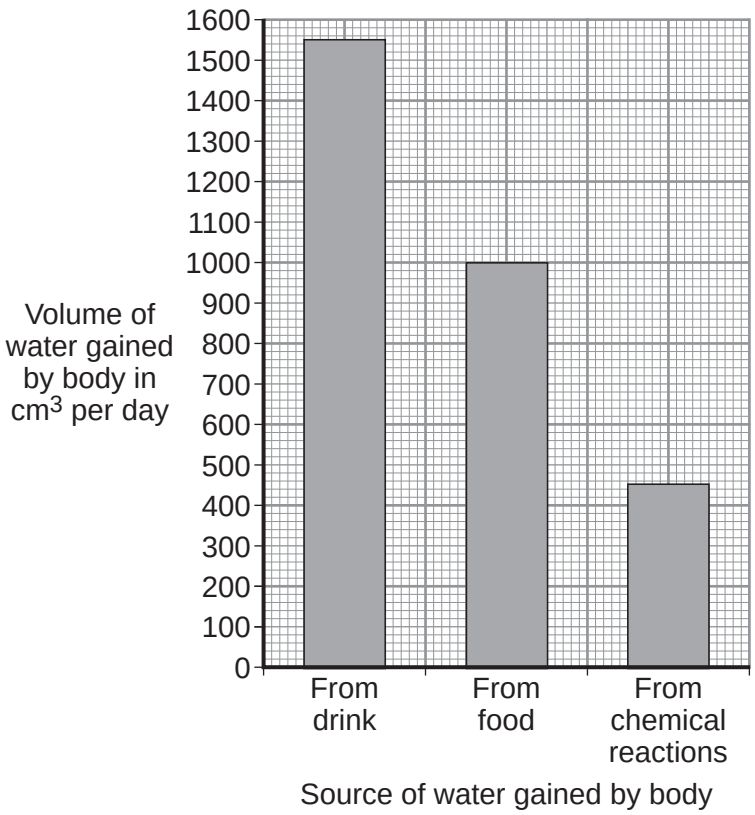
Question 3 continues on the next page

4.5.2.4 Control of body temperature (biology only)

Question 22 · continued

3 (b) **Bar chart 1** shows the volume of water the human body gains each day.

Bar chart 1



3 (b) (i) Calculate the total volume of water the body gains each day.

.....

.....

.....

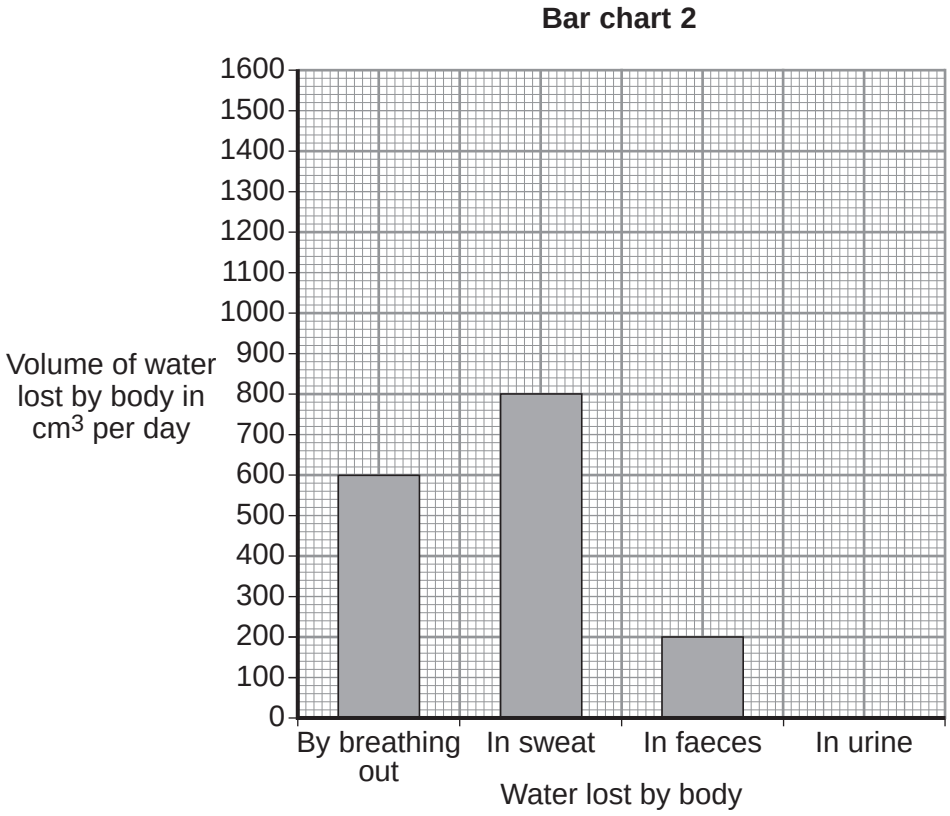
Total volume of water gained = ... cm^3

(2 marks)

4.5.2.4 Control of body temperature (biology only)

Question 22 · continued

Bar chart 2 shows the volume of water lost each day by breathing out, in sweat and in faeces.



3 (b) (ii) Calculate the total volume of water lost each day by breathing out, in sweat and in faeces.

.....

.....

Volume = ... cm^3

(1 mark)

3 (b) (iii) The volume of water the body loses must balance the volume of water the body gains.

Use your answers to part **(b)(i)** and part **(b)(ii)** to calculate the volume of water lost in urine.

.....

.....

Volume of water lost in urine = ... cm^3

(1 mark)

3 (b) (iv) Plot your answer to part **(b)(iii)** on **Bar chart 2**.

(1 mark)

4.5.2.4 Control of body temperature (biology only)

Question 22 · continued

3 (b) (v) After taking some types of recreational drugs, the kidneys produce very little urine.

What happens to the body cells if the kidneys produce very little urine?

.....

.....

(1 mark)

11

4.5.2.4 Control of body temperature (biology only)

Question 23

June 2014 | BL3FP | Original Q2 | Legacy

2 Human body temperature must be kept within narrow limits.

Figure 4 shows a cyclist in a race.

Figure 4



2 (a) Use the correct answer from the box to complete each sentence.

[3 marks]

blood	**brain**	**kidney**	**sweat**	**urine**

The cyclist's body temperature is monitored by a centre in the ..... .

This centre is sensitive to the temperature of the cyclist's ..... .

If the cyclist's body temperature increases, his body increases

the production of ..... .

4.5.2.4 Control of body temperature (biology only)

Question 23 · continued

2 (b) (i) Cyclists drink sports drinks after a race.

Table 1 shows the ratio of glucose to ions in three sports drinks, **A**, **B** and **C**.

Table 1

	Sports drink		
	A	**B**	**C**
Ratio of glucose (g per dm^3) to ions (mg per dm^3)	15:14	12:1	2:7

The closer this ratio of glucose to ions is to 1:1 in a sports drink, the faster the body replaces water.

Which sports drink, **A**, **B** or **C**, would replace water fastest in an athlete? ☐

[1 mark]

2 (b) (ii) Why should sports drinks contain ions?

[1 mark]

.....

.....

2 (b) (iii) Why should a person with diabetes **not** drink too much sports drink?

[1 mark]

.....

.....

6

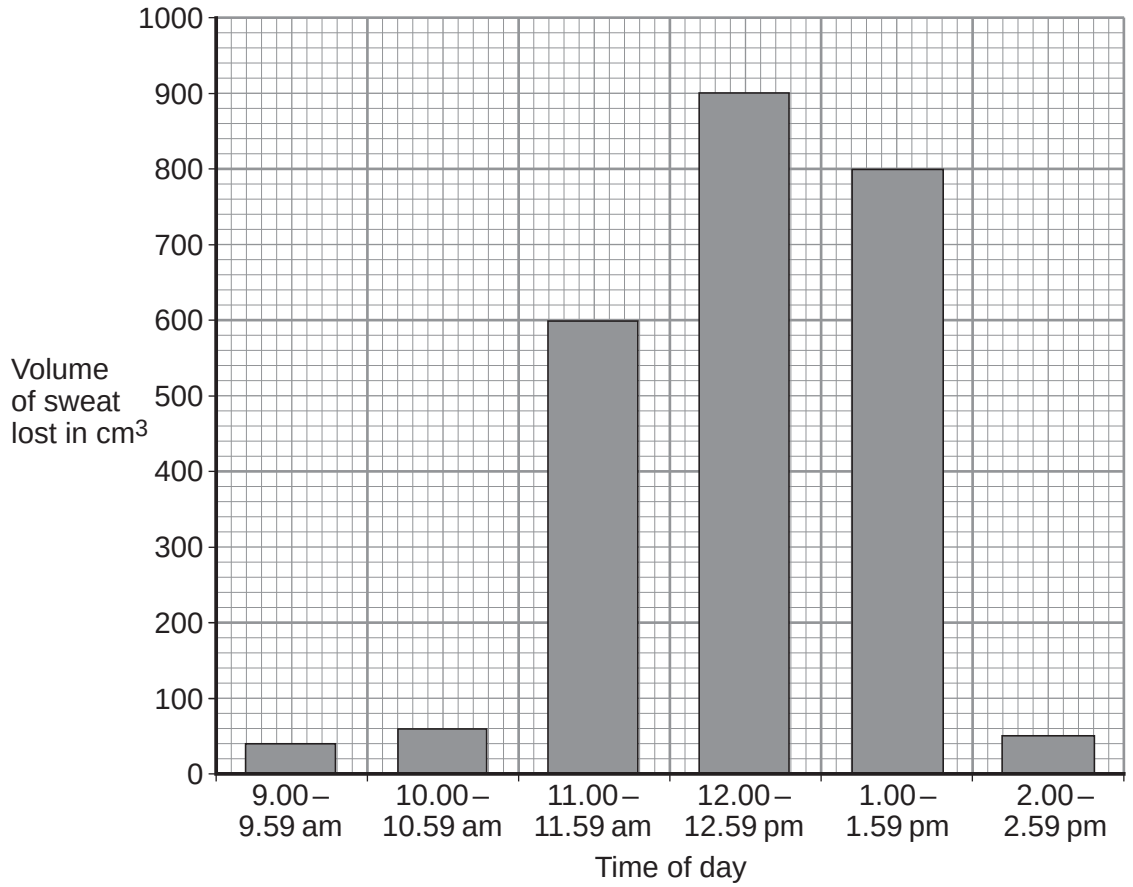
4.5.2.4 Control of body temperature (biology only)

Question 24

June 2016 | BL3FP | Original Q2 | Legacy

2 A scientist measured the volume of sweat lost between 9.00 am and 2.59 pm in one day by one person. **Figure 3** shows the results.

Figure 3



2 (a) (i) Suggest what happened at 11.00 am.

[1 mark]

Tick (✓) **one** box.

The person moved into a cold room. ☐

The person removed their coat. ☐

The person started running a race. ☐

2 (a) (ii) Calculate the total volume of sweat lost between 11.00 am and 1.59 pm.

[1 mark]

Total volume of sweat lost = _____ cm^3

4.5.2.4 Control of body temperature (biology only)

Question 24 · continued

2 (a) (iii) Suggest **one** way the person could replace the water that was lost as sweat.

[1 mark]

_____

_____

2 (b) (i) Sweating helps keep our internal body temperature within a narrow range.

Which organ monitors body temperature?

[1 mark]

Tick (✓) **one** box.

brain ☐

kidney ☐

pancreas ☐

2 (b) (ii) The organ that monitors internal body temperature receives information about temperature from the skin.

Which structures in the skin send impulses with this information?

[1 mark]

Tick (✓) **one** box.

capillaries ☐

glands ☐

receptors ☐

2 (c) How does sweating help to control body temperature?

[1 mark]

_____

_____

6

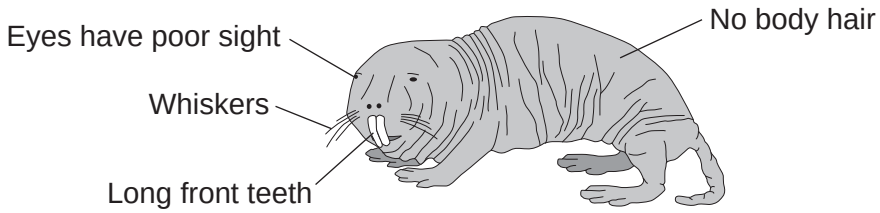
4.5.2.4 Control of body temperature (biology only)

Question 25

June 2017 | BL1FP | Original Q1 | Legacy

1 **Figure 1** shows a mole rat. Some of the mole rat's features are labelled.

Figure 1



Mole rats dig burrows underground and live in the burrows.

The body temperature of mole rats increases and decreases as the temperature of the burrows changes.

Draw **one** line from each feature of the mole rat to the best reason for the feature.

Do not use any reason or feature more than once.

[4 marks]

Feature	Reason for feature
Eyes have poor sight	Body temperature does not need to be controlled
Whiskers	Underground burrows are completely dark
Long front teeth	Underground burrows have low levels of oxygen
No body hair	Help to judge the width of the burrow
	Used for digging burrows

4

4.5.2.4 Control of body temperature (biology only)

Question 26

June 2019 | 8461/2F | Original Q6

0 6 Two of the substances the body excretes are urea and carbon dioxide.

0 6 . 1 Complete the sentence.

[1 mark]

Choose the answer from the box.

carbohydrate	**lipid**	**protein**	**salt**

A person makes a lot of urea if the person's diet contains

a lot of _____.

0 6 . 2 Why must urea be excreted from the body?

[1 mark]

_____

_____

0 6 . 3 A person produces more carbon dioxide during exercise than when resting.

Complete the sentences.

[2 marks]

Choose answers from the box.

breathing	**digestion**	**egestion**
osmosis	**respiration**	

The process that makes carbon dioxide is _____.

During exercise, extra carbon dioxide can be removed from the body by increasing the rate of _____.

0 6 . 4 Excess water must also be removed from the body.

If a person sweats a lot, less water will be excreted in the urine.

A healthy person did the same amount of exercise on each of 3 days.

Table 2 shows information for the 3 days.

Table 2

Day	Air temperature in °C	Volume of water consumed in cm^3	Relative amount of urine produced by the kidneys
1	30	1500	
2	20	1500	
3	15	2000	

Complete **Table 2**.

[2 marks]

Choose answers from the box.

least	medium	most

Question 6 continues on the next page

4.5.2.4 Control of body temperature (biology only)

Question 26 · continued

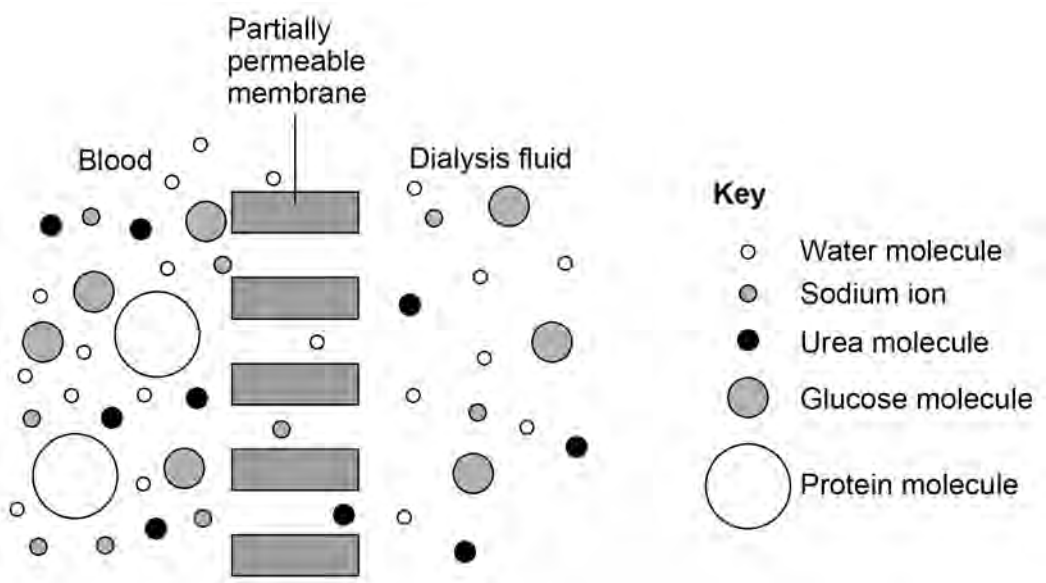
Some people have kidney disease.

Kidney disease may be treated by dialysis or by having a kidney transplant operation.

- During dialysis, a person is connected to a machine that filters the blood.
- Each dialysis session lasts about 6 hours.
- The person has several dialysis sessions each week.

Figure 12 shows how dialysis works.

Figure 12



0 6 . 5 How does urea move out of the blood during dialysis?

[1 mark]

Tick (✓) **one** box.

Diffusion ☐

Digestion ☐

Osmosis ☐

Respiration ☐

4.5.2.4 Control of body temperature (biology only)

Question 26 · continued

June 2019 | 8461/2F | Original Q6

0 6 . 6 Which substance in **Figure 12** does **not** pass from the blood into the dialysis fluid?

Give the reason for your answer.

[2 marks]

Substance _____

Reason _____

_____

Question 6 continues on the next page

Question 26 · continued

Two people have kidney disease.

- Person **A** is treated by dialysis.
- Person **B** has had a kidney transplant.

Figure 13 shows changes in the urea concentration in the blood of each person over 2 weeks.

Figure 13



0 6 . 7 How many dialysis sessions did person **A** have **each week**?

[1 mark]

_____

0 6 . 8 What happens to the concentration of urea in the blood between dialysis sessions?

[1 mark]

_____

0 6 . 9 Give **two** reasons why a kidney transplant is a better method for treating kidney disease than dialysis.

[2 marks]

1 _____

_____

2 _____

_____

13

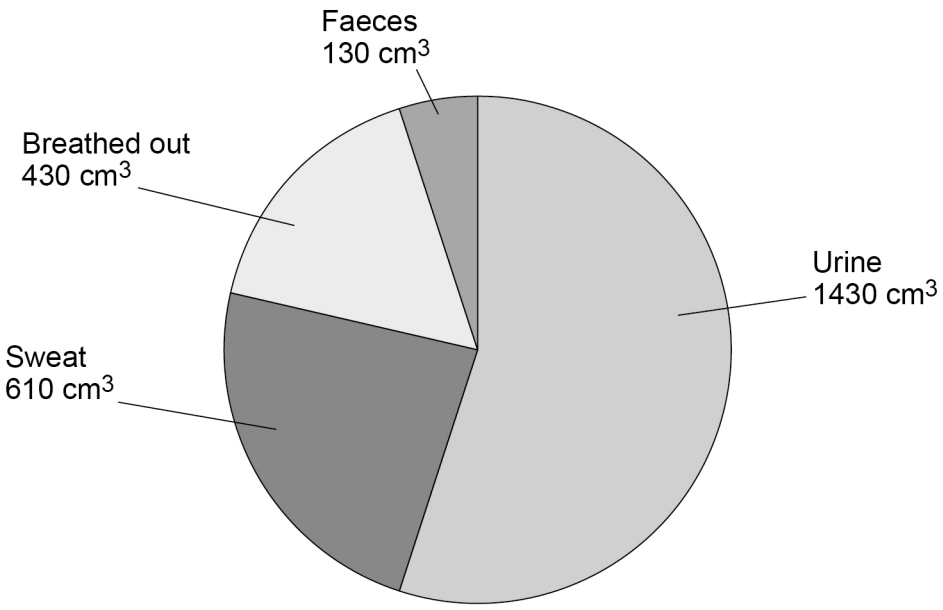
4.5.2.4 Control of body temperature (biology only)

Question 27

November 2020 | 8461/2F | Original Q4

0 4 **Figure 5** shows the water loss from a person on one day.

Figure 5



0 4 . 1 The total water loss was 2600 cm^3.

Calculate the percentage of the total water loss that was lost as urine.

[2 marks]

Percentage lost as urine = _____ %

4.5.2.4 Control of body temperature (biology only)

Question 27 · continued

A marathon race is 42 km long.

0 4 . 2 What happens to the volume of water lost as sweat when a person runs a marathon?

[1 mark]

0 4 . 3 What must marathon runners do to prevent themselves becoming dehydrated?

[1 mark]

0 4 . 4 Complete the sentences.

[3 marks]

Choose answers from the box.

digestion	**excretion**	**fertilisation**	**filtration**	**reabsorption**

Blood entering the kidneys goes through the process of

_____ .

Glucose is **not** found in urine because of _____.

Urine is removed from the body in the process of _____.

Question 4 continues on the next page

4.5.2.4 Control of body temperature (biology only)

Question 27 · continued

0 4 . 5 People with kidney failure can have dialysis or a kidney transplant.

Dialysis is often needed 3 times each week and can take over 4 hours each time.

Dialysis usually happens in a hospital.

Kidney transplants require a donor and major surgery.

Describe the advantages **and** disadvantages of having a kidney transplant instead of having dialysis.

[4 marks]

11

4.5.2.4 Control of body temperature (biology only)

Question 28

November 2021 | 8461/2F | Original Q10

1 0 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.

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

[1 mark]

Question 10 continues on the next page

4.5.2.4 Control of body temperature (biology only)

Question 28 · continued

Figure 17 and **Figure 18** show the scientists' results.

Figure 17

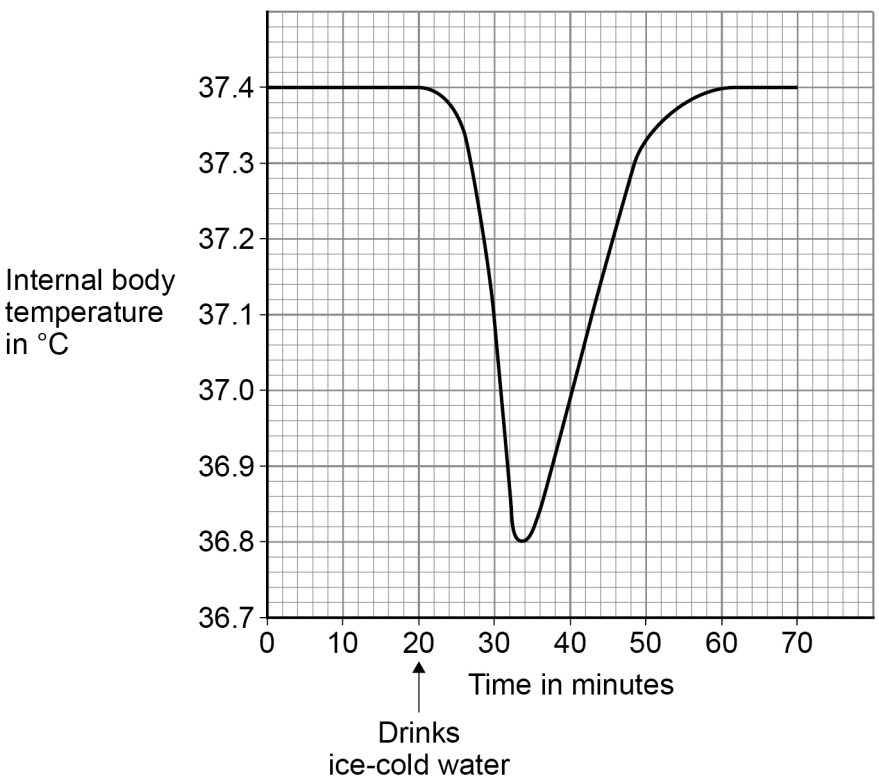
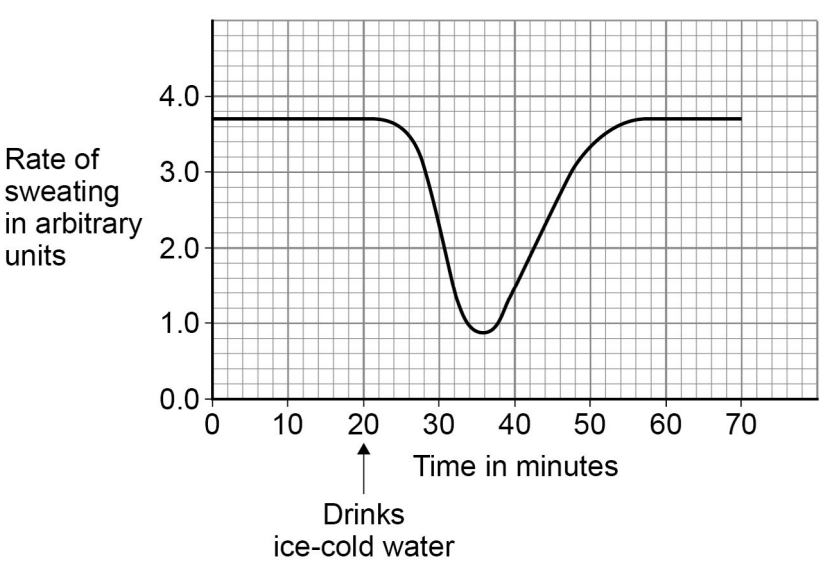


Figure 18



4.5.2.4 Control of body temperature (biology only)

Question 28 · continued

1 0 . 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.

1 0 . 3 Explain why the temperature near the brain decreased.

[2 marks]

1 0 . 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]

1 0 . 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 10 continues on the next page

4.5.2.4 Control of body temperature (biology only)

Question 28 · continued

10.6 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

4.5.2.4 Control of body temperature (biology only)

Question 29

June 2022 | 8461/2F | Original Q6

0 6 The echidna is a mammal that lives in Australia.

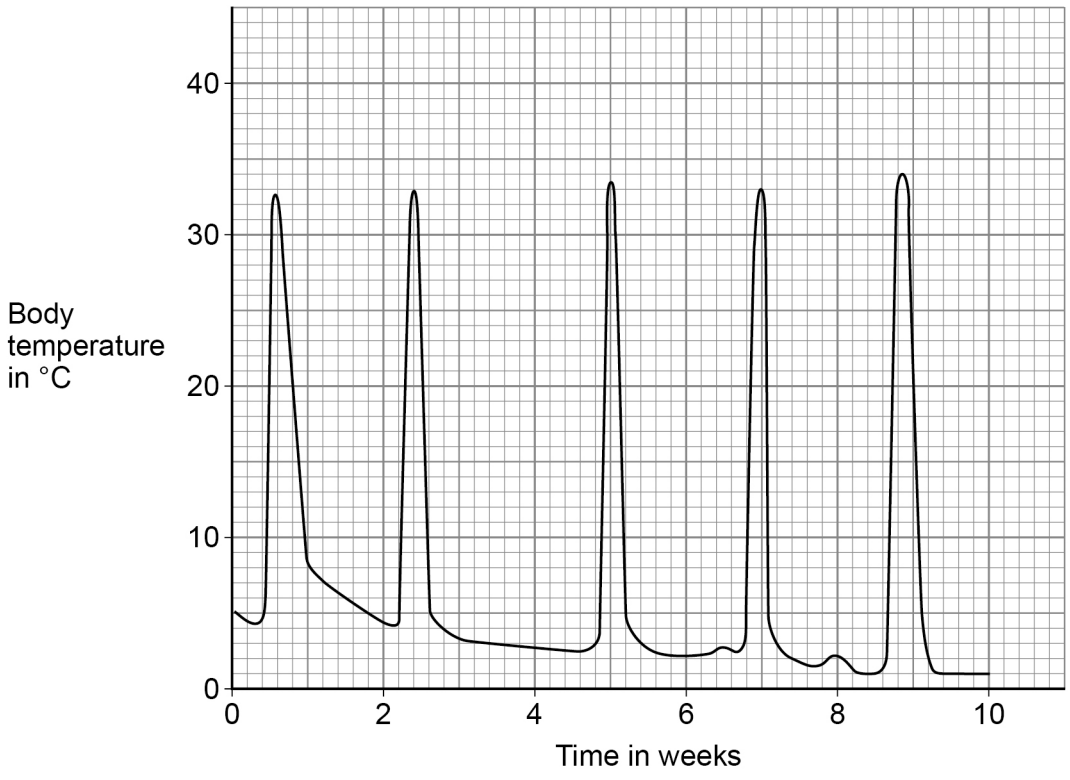
Figure 8 shows an echidna.

Figure 8



Figure 9 shows how the body temperature of the echidna varies during the cold winter months.

Figure 9



4.5.2.4 Control of body temperature (biology only)

Question 29 · continued

0 6 . 1 Give the lowest and highest body temperatures for the echidna shown in **Figure 9**.

[1 mark]

Lowest temperature = _____ °C

Highest temperature = _____ °C

In the cold winter months, the echidna hibernates.

Figure 9 shows that the echidna woke up from hibernation several times.

The echidna's body temperature increased to over 30 °C each time the echidna woke up.

0 6 . 2 How many times did the echidna wake up?

Use information from **Figure 9**.

[1 mark]

_____

0 6 . 3 Each time the echidna wakes up, it hunts for food.

Suggest why the echidna needs to eat food several times during hibernation.

[1 mark]

_____

_____

Question 6 continues on the next page

4.5.2.4 Control of body temperature (biology only)

Question 29 · continued

June 2022 | 8461/2F | Original Q6

0 6 . 4 During hibernation:

- the echidna sleeps
- the echidna's body temperature decreases to below 5 °C
- the echidna uses food stored in its body cells to provide energy.

What process releases energy from stored food?

[1 mark]

Tick (✓) **one** box.

Diffusion ☐

Excretion ☐

Respiration ☐

0 6 . 5 Most mammals use a lot of energy to evaporate sweat.

The echidna does **not** sweat.

Suggest **one** use of energy in the echidna's body.

[1 mark]

4.5.2.4 Control of body temperature (biology only)

Question 29 · continued

June 2022 | 8461/2F | Original Q6

The control of body temperature is important in the human body.

An athlete trained in a hot climate.

0 6 . 6 On one day, the athlete lost 3 200 cm^3 of water in sweat.

Evaporation of 1 cm^3 of sweat requires 2.5 kJ of energy.

Calculate the energy the athlete used for evaporation of sweat.

[2 marks]

Energy = _____ kJ

0 6 . 7 On a different day the athlete used 6 000 kJ of energy to evaporate sweat.

The athlete's energy intake was 24 000 kJ.

Calculate the percentage of the athlete's energy intake used for evaporation of sweat.

[2 marks]

Percentage = _____ %

0 6 . 8 Some days the athlete did **not** do any training and rested at home.

What effect would resting have on the volume of sweat produced each day?

[1 mark]

10

4.5.2.4 Control of body temperature (biology only)

Question 30

June 2025 | 8461/2F | Original Q4

0 4 It is important to maintain the water balance of the body.

The volume of water a person gained and lost was measured on a day the person did no exercise.

Table 2 shows how much water the person gained and lost by different methods on the day.

Table 2

Water gained	
Method	**Volume in cm^3**
Food	550
Drink	1540
Metabolism	410
Total	2500

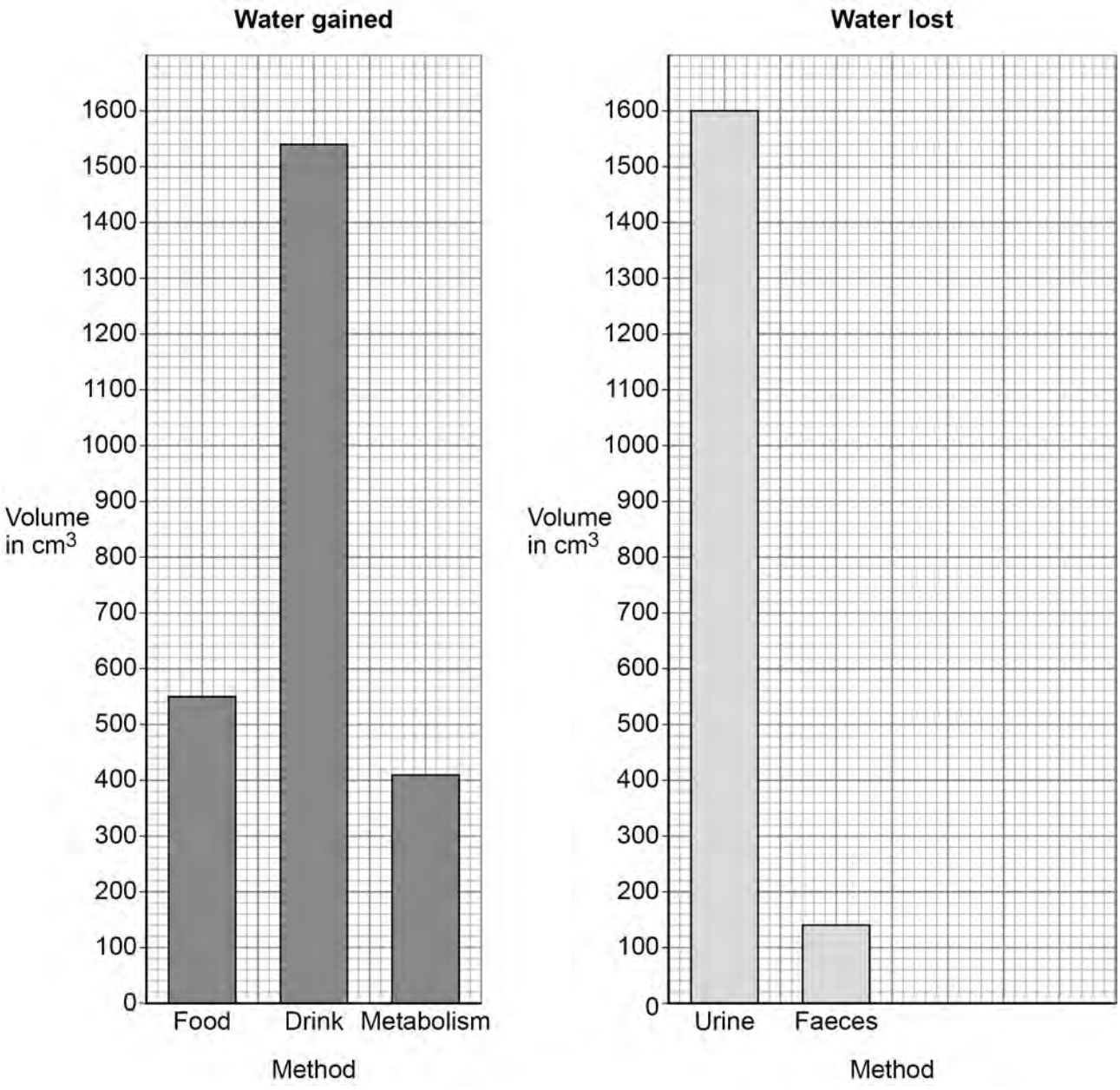
Water lost	
Method	**Volume in cm^3**
Urine	1600
Faeces	140
Sweat	420
Breathing	340
Total	2500

4.5.2.4 Control of body temperature (biology only)

Question 30 · continued

Figure 7 shows some of the data from **Table 2**.

Figure 7



0 4 . 1 Complete **Figure 7**.

[2 marks]

You should:

- plot the data for sweat and for breathing from **Table 2**
- label each bar.

Question 4 continues on the next page

4.5.2.4 Control of body temperature (biology only)

Question 30 · continued

0 4 . 2 On another day, the person ran in a long-distance race.

What would happen to the volume of water lost by sweating on the day of the race?

[1 mark]

Tick (✓) **one** box.

Decrease ☐

No change ☐

Increase ☐

0 4 . 3 The kidneys control the amount of water in the body.

Draw **one** line from each process in the kidneys to the name of that process.

[3 marks]

Process in the kidneys	Name of process
Removes water from the blood	Coordination
Takes excess water out of the body	Excretion
Takes water back into the blood	Filtration
	Reabsorption

4.5.2.4 Control of body temperature (biology only)

Question 30 · continued

0 4 . 4 A person with kidney failure can be treated by dialysis or by a kidney transplant.

For dialysis:

- a person needs 3 dialysis sessions each week
- each session can last 6 to 8 hours
- each session has to happen in a hospital.

For a kidney transplant:

- a suitable donor is needed
- a surgical operation is needed.

Evaluate the use of a kidney transplant instead of dialysis for treating kidney failure.

Include your own knowledge in your answer.

[4 marks]

Extra space

10