AQA GCSE Combined Science - Trilogy | 8464

SPECIFICATION POINT 4.5.1

Homeostasis

Past-paper questions

Tier	**Higher**
Question groups	**3**
Available paper years	**2019–2024**

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.

4.5.1 Homeostasis

Question 01

June 2019 | 8464/B/2H | Original Q6

0 6 This question is about homeostasis.

0 6 . 1 Define the term homeostasis.

[2 marks]

0 6 . 2 Name the hormone released if the blood glucose concentration falls too low.

[1 mark]

Question 6 continues on the next page

Question 01 · continued

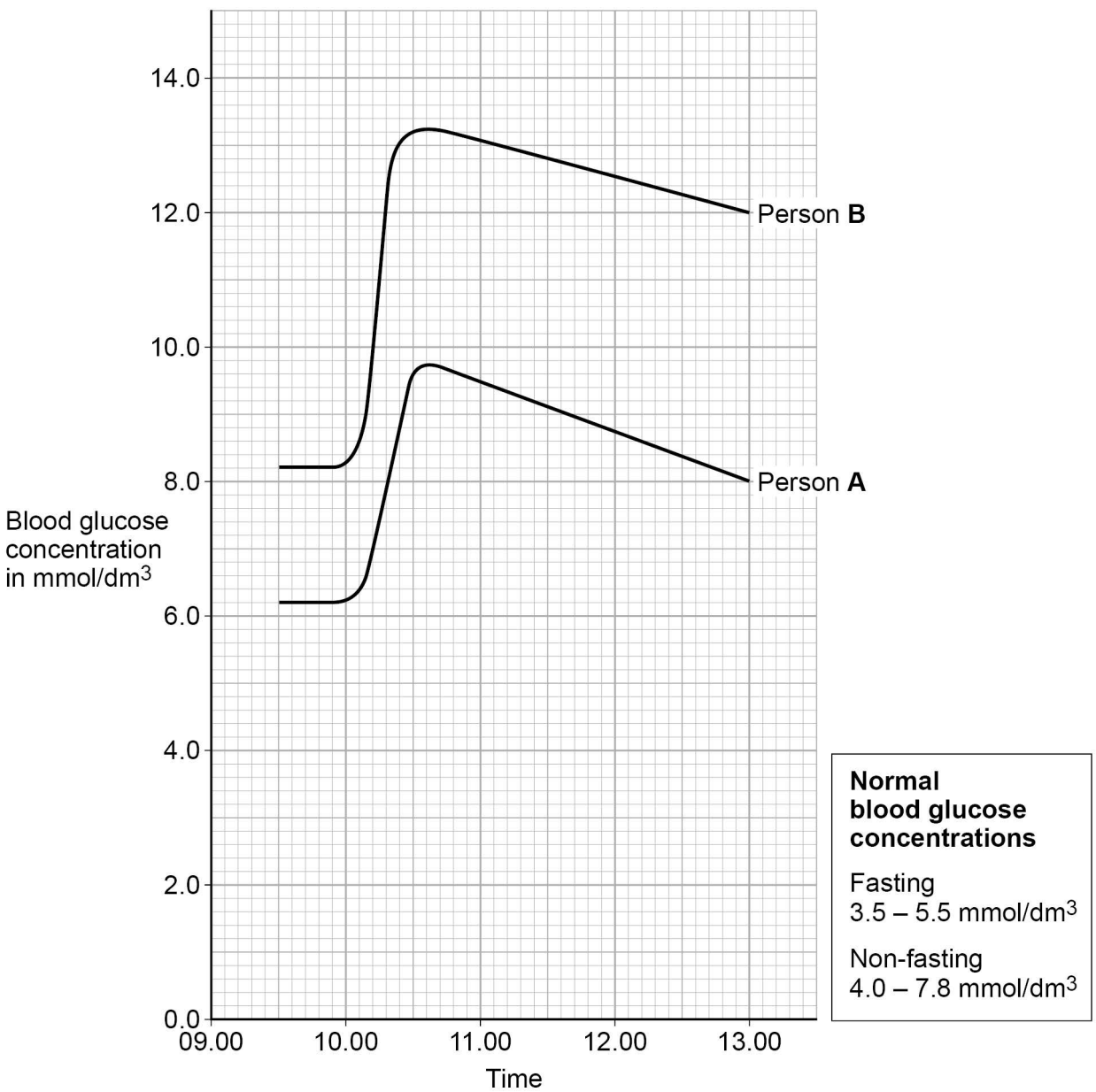
Two people were sent to a hospital to find out if they have diabetes.

This is the method used at the hospital.

- Do not eat or drink after midnight. This is called fasting.
- Measure blood glucose concentration at 9.30 am
- Drink a glucose solution at 10.00 am
- Measure blood glucose concentration for the next 3 hours.

Figure 4 shows the results.

Figure 4



4.5.1 Homeostasis

Question 01 · continued

Person **A** and person **B** have diabetes.

0 6 . 3 Describe how **Figure 4** shows that person **B** has diabetes.

Use data from **Figure 4**.

[3 marks]

Question 6 continues on the next page

0 6 . 4 Person **A** and person **B** had a test to measure the concentration of insulin in their blood when they were fasting.

Table 4 shows the results.

Table 4

Person	Fasting blood insulin concentration in arbitrary units
A	280
B	20
Normal range	50–175

Suggest which type of diabetes person **A** and person **B** have.

Give a reason for each answer.

[2 marks]

Person **A**

Type of diabetes _____

Reason _____

_____

Person **B**

Type of diabetes _____

Reason _____

_____

4.5.1 Homeostasis

Question 01 · continued

0 6 . 5 Toxic hypoglycaemia syndrome (THS) has caused the deaths of hundreds of starving children in some tropical countries.

- The starving children have had nothing to eat all day.
- The starving children then eat many lychee fruits.
- The lychee fruits contain a molecule which stops an enzyme in the liver working.
- This enzyme normally converts stored fats into glucose.

Children who have eaten during the day are **not** affected by eating many lychee fruits.

Starving children may die from eating many lychee fruits but children who have eaten during the day are not affected.

Explain why.

[6 marks]

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4.5.1 Homeostasis

Question 02

0 6 The control of body temperature is an example of homeostasis.

0 6 . 1 Give **one** other internal condition controlled by homeostasis.

Do **not** refer to temperature in your answer.

[1 mark]

0 6 . 2 Explain why the control of body temperature is important.

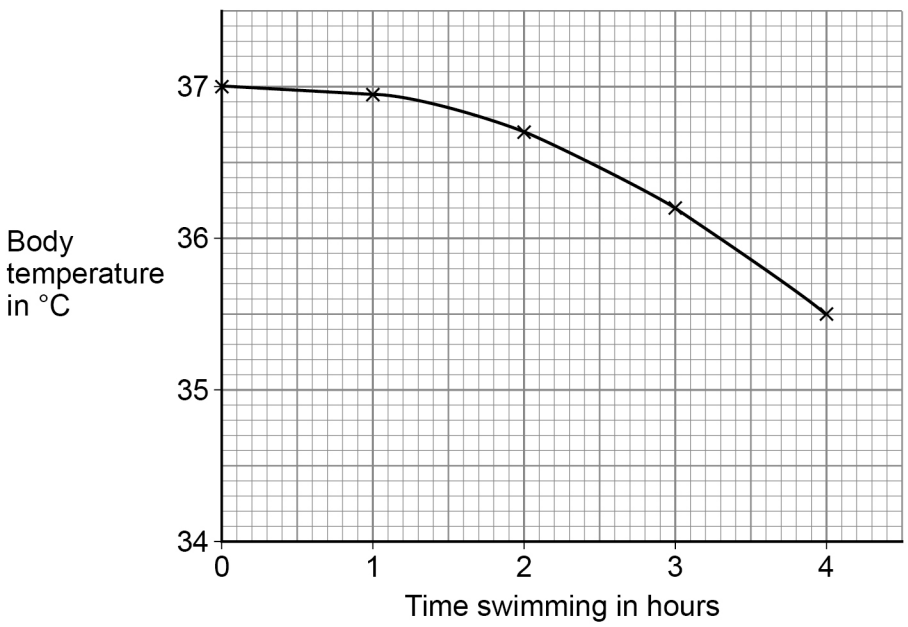
[2 marks]

Question 6 continues on the next page

The body temperature of long-distance swimmers can change as the length of time swimming in cold water increases.

Figure 4 shows how the body temperature of one swimmer changed in the first 4 hours of a long-distance swim.

Figure 4



0 6 . 3 Calculate the mean rate of body temperature decrease per hour in the first 4 hours of the swim.

[2 marks]

Rate = _____ °C per hour

4.5.1 Homeostasis

Question 02 · continued

0 6 . 4 Hypothermia is a dangerously low body temperature.

For this swimmer, a 5.5% decrease in body temperature from the start of the swim will cause hypothermia.

Determine the body temperature at which this swimmer will start to have hypothermia.

Give your answer to 2 significant figures.

[4 marks]

Body temperature (2 significant figures) = _____ °C

Question 6 continues on the next page

4.5.1 Homeostasis

Question 02 · continued

A decrease in body temperature causes the adrenal glands and the thyroid gland to be stimulated.

0 6 . 5 Which gland secretes hormones to stimulate the adrenal glands?

[1 mark]

0 6 . 6 Explain the role of the adrenal glands in responding to a decrease in body temperature.

[5 marks]

4.5.1 Homeostasis

Question 02 · continued

0 6 . 7 Explain how the thyroid gland controls the response to a decrease in body temperature by negative feedback.

[3 marks]

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4.5.1 Homeostasis

Question 03

0 6 Hormones are released from endocrine glands.

0 6 . 1 Which gland releases hormones to control other glands?

[1 mark]

Tick (✓) **one** box.

- Adrenal ☐
- Pituitary ☐
- Thyroid ☐

Several hormones can affect blood glucose concentration.

0 6 . 2 Adrenaline can increase blood glucose concentration.

What is **one** other effect of adrenaline?

[1 mark]

Tick (✓) **one** box.

- Decreased breathing rate ☐
- Decreased metabolic rate ☐
- Increased blood flow to muscles ☐
- Increased FSH production ☐

0 6 . 3 Cells in the pancreas detect changes in blood glucose concentration.

What type of cell in the body detects changes?

[1 mark]

_____

Question 6 continues on the next page

4.5.1 Homeostasis

Question 03 · continued

Scientists investigated whether blood glucose concentration affects reaction time.

The reaction times of ten people with Type 1 diabetes were measured.

This is the method used.

1. Tell one person to drink a glucose solution.
2. Monitor the person's blood glucose concentration.
3. Record the person's reaction time when the person's blood glucose concentration is:
   - 16 mmol/dm^3
   - 6 mmol/dm^3
   - 3 mmol/dm^3
4. Repeat steps 1 to 3 for the nine other people.

0 6 . 4 People with Type 1 diabetes were selected for the investigation instead of people who did **not** have diabetes.

Explain why.

[2 marks]

4.5.1 Homeostasis

Question 03 · continued

0 6 . 5 Control variables between the different people in the investigation included:

- age
- sex
- food and drink consumed before and during the test.

Suggest **two other** control variables that should be used in the investigation.

[2 marks]

1 _____

_____

2 _____

_____

0 6 . 6 It was important for the scientists to monitor the health of each person during the investigation.

Suggest **one** reason why.

[1 mark]

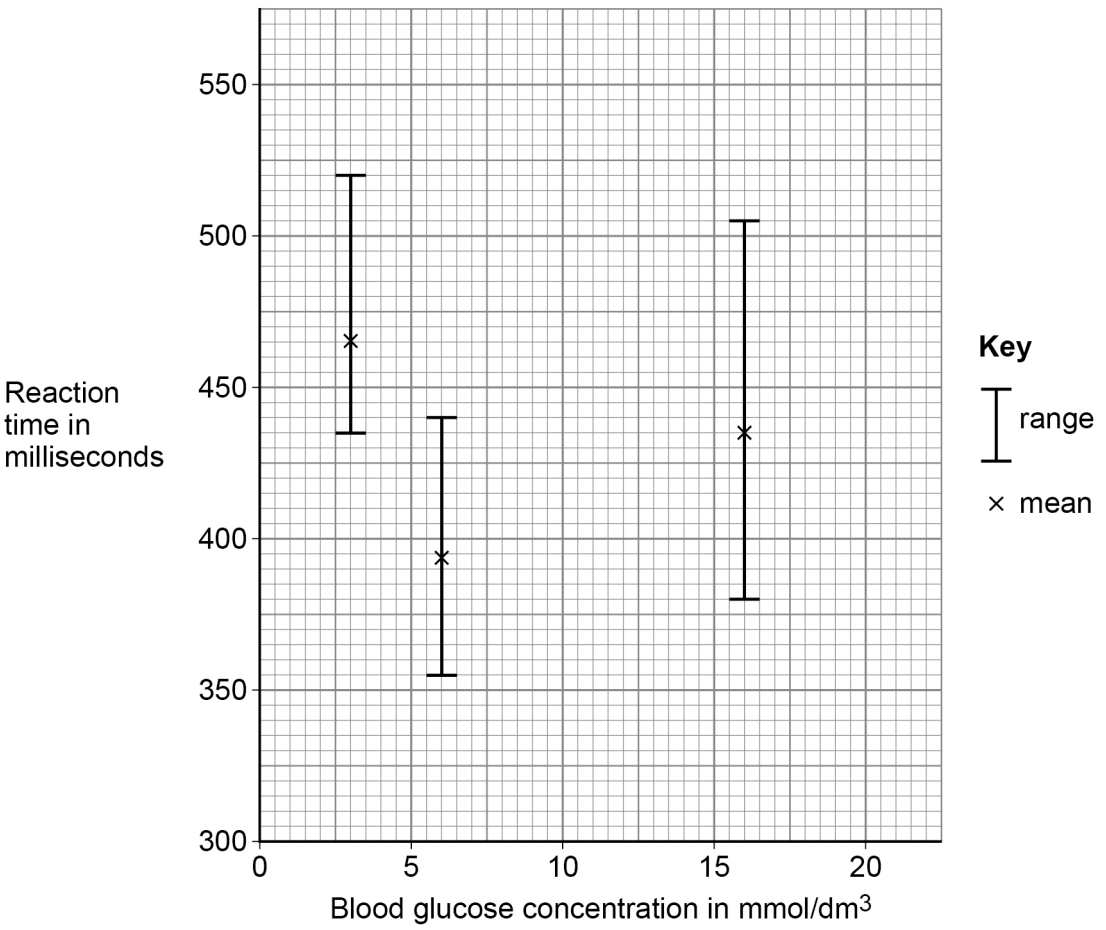
_____

_____

Question 6 continues on the next page

Figure 6 shows the results.

Figure 6



0 6 . 7 People who do **not** have diabetes usually have a blood glucose concentration in the range of 4.0 mmol/dm^3 to 7.8 mmol/dm^3.

Describe how the results in **Figure 6** show the importance of homeostasis.

[2 marks]

4.5.1 Homeostasis

Question 03 · continued

0 6 . 8 Describe how blood glucose concentration is maintained within narrow limits in people who do **not** have diabetes.

[5 marks]

0 6 . 9 The scientists gave the hypothesis:

‘Optimum blood glucose concentration increases the production of chemicals that diffuse across synapses.’

Describe how an increase in the chemicals could decrease reaction time.

[2 marks]

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