AQA GCSE Combined Science - Trilogy | 8464

SPECIFICATION POINT 4.5.3.2

Control of blood glucose concentration

Past-paper questions

Tier	**Higher**
Question groups	**6**
Available paper years	**2019–2025**

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.

4.5.3.2 Control of blood glucose concentration

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

4.5.3.2 Control of blood glucose concentration

Question 01 · continued

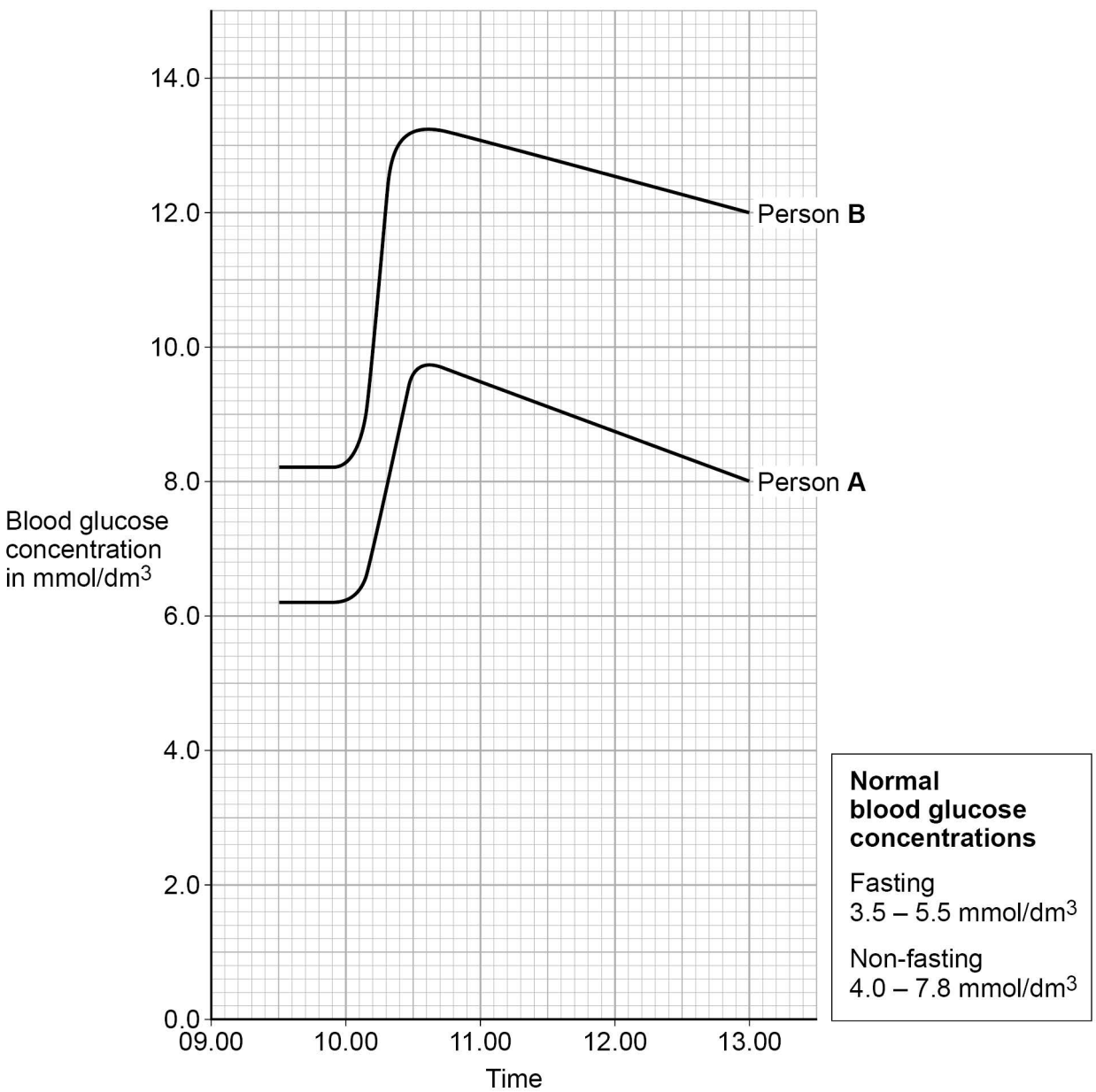
Two people were sent to a hospital to find out if they have diabetes.

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



4.5.3.2 Control of blood glucose concentration

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

4.5.3.2 Control of blood glucose concentration

Question 01 · continued

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 _____

_____

4.5.3.2 Control of blood glucose concentration

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]

14

4.5.3.2 Control of blood glucose concentration

Question 02

November 2020 | 8464/B/2H | Original Q4

0 4 . 1 In sexual reproduction, cells divide by meiosis to form gametes.

Which **two** statements are true for cell division by meiosis?

[2 marks]

Tick (✓) **two** boxes.

- Daughter cells have two sets of chromosomes. ☐
- Four daughter cells are formed. ☐
- The daughter cells are genetically identical. ☐
- The DNA replicates twice. ☐
- The parent cell divides twice. ☐

4.5.3.2 Control of blood glucose concentration

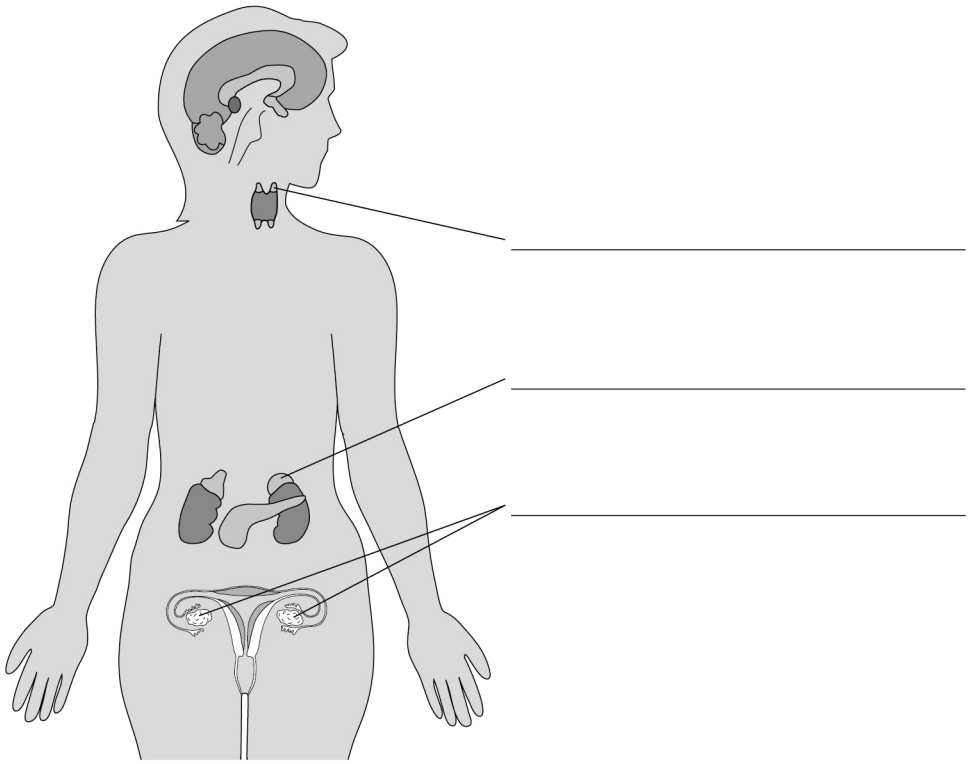
Question 02 · continued

Hormones are released from endocrine glands.

Each hormone travels in the bloodstream to a target organ.

Figure 3 shows the position of endocrine glands in a female.

Figure 3



0 4 . 2 Label the endocrine glands on **Figure 3**.

[3 marks]

Question 4 continues on the next page

0 4 . 3 Complete **Table 2**.

[3 marks]

Table 2

Hormone	Name of gland which releases hormone	Target organ of hormone
Luteinising hormone (LH)	Pituitary gland	
	Adrenal gland	
Glucagon		

Millions of geranium plants are sold each year in garden centres.

Geraniums can be reproduced asexually or sexually.

Figure 4 shows a potted geranium plant.

Figure 4



4.5.3.2 Control of blood glucose concentration

Question 02 · continued

Garden centres usually grow new geranium plants by asexual reproduction.

0 4 . 4 Suggest **two** advantages for garden centres of growing geraniums by asexual reproduction compared with sexual reproduction.

[2 marks]

1 _____

_____

2 _____

_____

0 4 . 5 Suggest **two** disadvantages for garden centres of growing geraniums by asexual reproduction compared with sexual reproduction.

[2 marks]

1 _____

_____

2 _____

_____

12

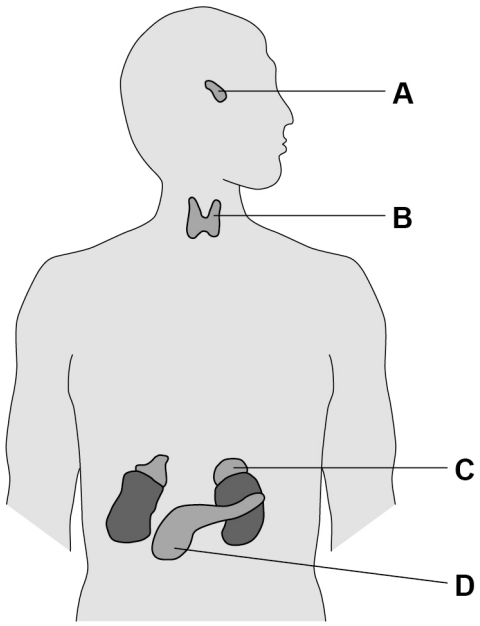
4.5.3.2 Control of blood glucose concentration

Question 03

November 2021 | 8464/B/2H | Original Q1

0 1 **Figure 1** shows glands in the human body.

Figure 1



0 1 . 1 Which organ system includes the glands shown in **Figure 1**?

[1 mark]

0 1 . 2 Which gland produces insulin?

[1 mark]

Tick (✓) **one** box.

A ☐ **B** ☐ **C** ☐ **D** ☐

0 1 . 3 Which gland produces hormones that stimulate the other glands to produce hormones?

[1 mark]

Tick (✓) **one** box.

A ☐ **B** ☐ **C** ☐ **D** ☐

4.5.3.2 Control of blood glucose concentration

Question 03 · continued

0 1 . 4 How do hormones travel from one gland to another gland?

[1 mark]

0 1 . 5 Name **two** glands involved in human reproduction.

Do **not** refer to glands shown on **Figure 1** in your answer.

[2 marks]

1 _____

2 _____

0 1 . 6 Ovulation test kits can help women know when they are most fertile.

Ovulation test kits detect the increase in the hormone that stimulates ovulation.

Which hormone is detected by ovulation test kits?

[1 mark]

Tick (✓) **one** box.

- Follicle stimulating hormone (FSH) ☐
- Luteinising hormone (LH) ☐
- Oestrogen ☐
- Progesterone ☐

4.5.3.2 Control of blood glucose concentration

Question 03 · continued

0 1 . 7 A new contraceptive drug for men is being tested.

The drug:

- is given in one injection
- stops sperm being able to fertilise eggs
- is effective for up to 13 years.

Evaluate the use of the new drug compared with existing contraceptive methods.

[6 marks]

13

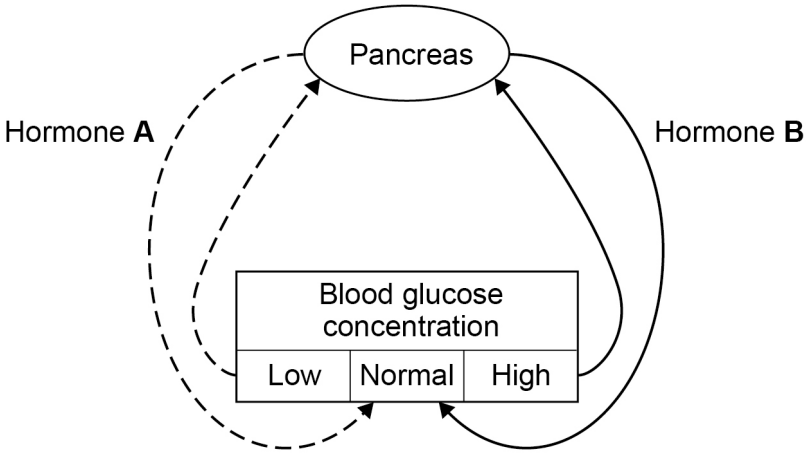
4.5.3.2 Control of blood glucose concentration

Question 04

0 5 Blood glucose concentration in the human body needs to be kept within the normal range.

Figure 4 shows that two hormones control blood glucose concentration.

Figure 4



0 5 . 1 Name the type of hormonal control shown in **Figure 4**.

[1 mark]

_____

0 5 . 2 Name hormones **A** and **B** in **Figure 4**.

[1 mark]

A _____

B _____

4.5.3.2 Control of blood glucose concentration

Question 04 · continued

0 5 . 3 Explain how the two hormones in **Figure 4** keep the blood glucose concentration within the normal range for 3 hours after a meal.

[6 marks]

Question 5 continues on the next page

4.5.3.2 Control of blood glucose concentration

Question 04 · continued

Female reproductive hormones are used to treat infertility in women.

0 5 . 4 Follicle Stimulating Hormone (FSH) and then Luteinising Hormone (LH) can be injected into a woman to help her become pregnant by sexual intercourse.

Explain how injecting FSH and then LH will help a woman to become pregnant.

[3 marks]

0 5 . 5 In some women the injections of FSH and LH are the first steps for In Vitro Fertilisation (IVF).

Describe the remaining steps in IVF.

[4 marks]

4.5.3.2 Control of blood glucose concentration

Question 04 · continued

0 5 . 6 There are two different processes of cell division in humans.

Describe **three** differences between cell division to form sperm cells compared with cell division to form liver cells.

[3 marks]

1 _____

_____

_____

2 _____

_____

_____

3 _____

_____

_____

18

4.5.3.2 Control of blood glucose concentration

Question 05

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 ☐

4.5.3.2 Control of blood glucose concentration

Question 05 · continued

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

4.5.3.2 Control of blood glucose concentration

Question 05 · 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]

4.5.3.2 Control of blood glucose concentration

Question 05 · 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]

_____

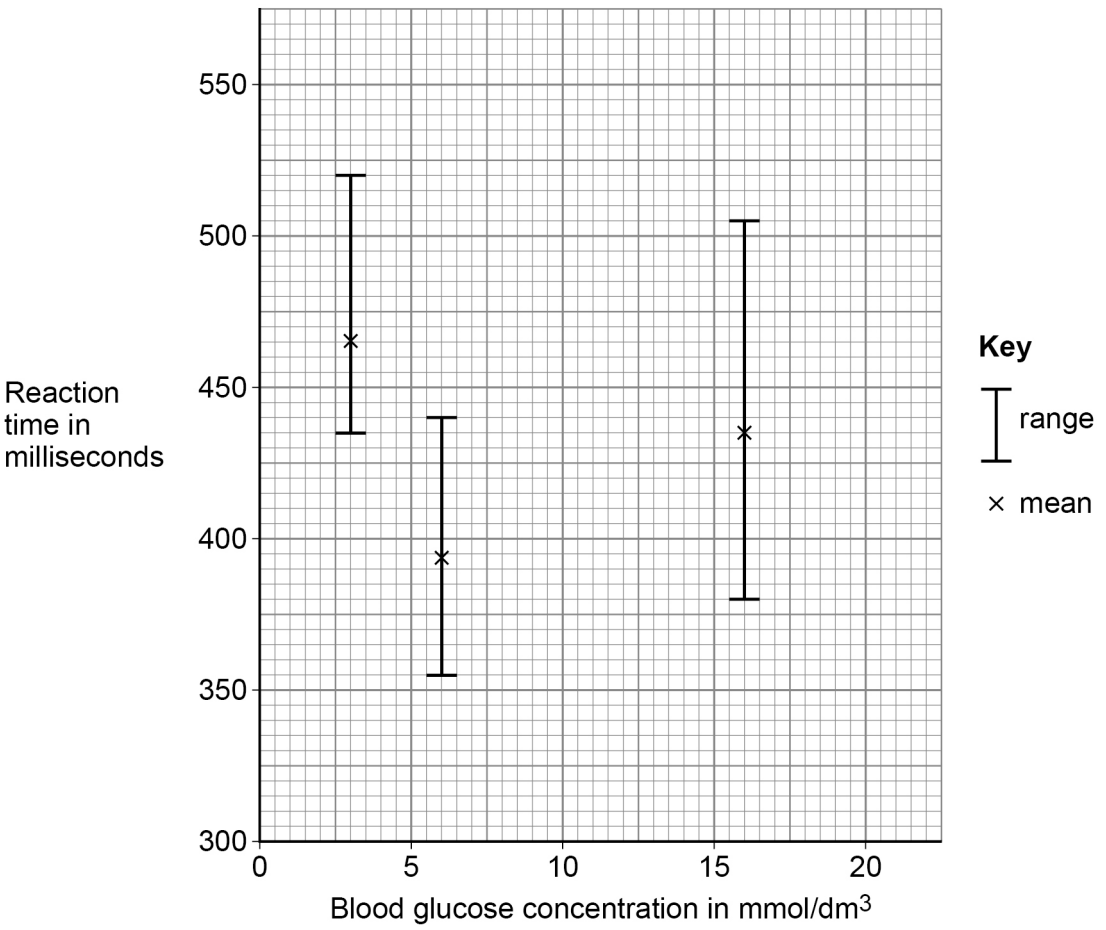
_____

Question 6 continues on the next page

4.5.3.2 Control of blood glucose concentration

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]

4.5.3.2 Control of blood glucose concentration

Question 05 · 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]

17

4.5.3.2 Control of blood glucose concentration

Question 06

0 6 The human body makes the hormone insulin and a chemical called C-peptide.

C-peptide concentration in the blood has a linear relationship with the amount of insulin the body produces.

0 6 . 1 Which equation represents a linear relationship?

[1 mark]

Tick (✓) **one** box.

$y = mc + x$ ☐

$y = mc^2 + x$ ☐

$y = mx + c$ ☐

$y = mx^2 + c$ ☐

Question 06 · continued

0 6 . 2 When the body makes insulin, C-peptide is also made.

The concentration of C-peptide in the blood is **not** increased by insulin injections.

Some people with Type 2 diabetes are **incorrectly** told they have Type 1 diabetes.

Doctors can test the concentration of C-peptide in the blood to check which type of diabetes a person has.

Explain:

- how the test can indicate which type of diabetes a person has
- the importance of finding out whether a person being treated for Type 1 diabetes actually has Type 2 diabetes.

[6 marks]

Extra space

Question 6 continues on the next page

4.5.3.2 Control of blood glucose concentration

Question 06 · continued

Glucagon is a hormone produced by the body.

0 6 . 3 Which organ produces glucagon?

[1 mark]

Tick (✓) **one** box.

- Liver ☐
- Pancreas ☐
- Small intestine ☐
- Stomach ☐

0 6 . 4 In some people, glucagon is produced in smaller quantities than is needed.

Explain why people who do **not** produce enough glucagon feel weak and tired.

[4 marks]

Extra space

12