

GCSE Combined Science: Trilogy

Worksheet: Control of blood glucose concentration

TIME 35 min	TOTAL 31 marks	CALCULATOR Allowed	DIFFICULTY Easy, Medium
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Topics: Control of blood glucose concentration

NAME _____ **CLASS** _____ **DATE** _____

- Use black ink or black ball-point pen. Pencil should only be used for drawing.
- Answer all questions in the spaces provided.
- In all calculations, show clearly how you work out your answer.
- The marks for questions are shown in brackets.

0 1

Zara ate a slice of cake at 0 minutes. Zara does not have diabetes.

Table 1 shows Zara's blood glucose concentration at 0 minutes and at two later times.

Table 1

Time after eating in minutes	Blood glucose concentration in mmol/dm ³
0	4.6
30	7.3
90	5.1

0 1 . 1

Calculate the increase in Zara's blood glucose concentration between 0 minutes and 30 minutes.

.....

.....

.....

.....

Increase = mmol/dm³

[2 marks]

0 1 . 2

Name the hormone that caused Zara’s blood glucose concentration to fall between 30 minutes and 90 minutes.

.....

.....

.....

.....

[1 mark]

0 2

Hassan drank a sugary drink at 0 minutes. Hassan does not have diabetes.
Table 2 shows Hassan’s blood glucose concentration at 0 minutes and at two later times.

Table 2

Time after drinking in minutes	Blood glucose concentration in mmol/dm ³
0	5.3
45	7.9
120	5.8

0 2 . 1

Calculate the increase in Hassan’s blood glucose concentration between 0 minutes and 45 minutes.

.....

.....

.....

.....

Increase = mmol/dm³

[2 marks]

0 2 . 2

Name the hormone that caused Hassan’s blood glucose concentration to fall between 45 minutes and 120 minutes.

.....

.....

.....

.....

[1 mark]

0 3

The concentration of glucose in the blood is controlled by hormones.

0 3 . 1

Which organ monitors and controls the blood glucose concentration?

Tick (✓) **one** box.

Kidney

☐

Liver

☐

Pancreas

☐

Pituitary gland

☐

[1 mark]

0 3 . 2

Name the hormone that is released when the blood glucose concentration is too high.

.....

.....

.....

.....

[1 mark]

0 3 . 3

In liver and muscle cells, excess glucose is converted into a storage substance.
Name this storage substance.

.....

.....

.....

.....

[1 mark]

0 3 . 4

Type 1 diabetes is normally treated with insulin injections.
What is the cause of Type 1 diabetes?

.....

.....

[1 mark]

0 3 . 5

Which **two** are common treatments for Type 2 diabetes?
Tick (✓) **two** boxes.

A carbohydrate-controlled diet

☐

A course of antibiotics

☐

An exercise programme

☐

A kidney transplant

☐

A vaccination

☐

[2 marks]

0 4

The pancreas monitors and controls the concentration of glucose in the blood.

0 4 . 1

Which type of diabetes is caused by the pancreas failing to produce enough insulin?

.....

.....

.....

.....

[1 mark]

0 4 . 2

Which statement describes Type 1 diabetes when it is not treated?

Tick (✓) **one** box.

The blood glucose concentration is always too low

☐

The blood glucose concentration is uncontrolled and too high

☐

The body cells no longer respond to insulin

☐

The pancreas produces too much insulin

☐

[1 mark]

0 4 . 3

Which **two** of these are appropriate ways of managing Type 1 diabetes?

Tick (✓) **two** boxes.

A course of antibiotics

☐

Avoiding all carbohydrate in the diet

☐

Insulin injections

☐

Monitoring the blood glucose concentration regularly

☐

A kidney transplant

☐

[2 marks]

0 4 . 4

Give **one** risk factor for developing Type 2 diabetes.

[1 mark]

0 5

Kai drank a large glass of fruit juice at 0 minutes. Kai does not have diabetes.
Table 3 shows Kai's blood glucose concentration at 0 minutes and at two later times.

Table 3

Time after drinking in minutes	Blood glucose concentration in mmol/dm ³
0	4.8
45	7.3
135	5.7

0 5 . 1

Calculate the percentage increase in Kai's blood glucose concentration between 0 minutes and 45 minutes.
Give your answer to 3 significant figures.

.....

.....

.....

.....

Percentage increase = %

[2 marks]

0 5 . 2

Calculate the percentage decrease in Kai's blood glucose concentration between 45 minutes and 135 minutes.
Give your answer to 3 significant figures.

.....

.....

.....

.....

Percentage decrease = %

[2 marks]

0 5 . 3

Explain why Kai's blood glucose concentration decreased after 45 minutes.

.....

.....

.....

.....

[2 marks]

0 6

Two people each had a drink containing 75 g of glucose. Person A does not have diabetes. Person B has Type 1 diabetes and did not inject any insulin during the test. Figure 1 shows the blood glucose concentrations of both people. The solid line is person A and the dashed line is person B.

Figure 1



0 6 . 1

Describe how the blood glucose concentration of person A changed between 0 and 120 minutes.

.....

.....

.....

.....

[2 marks]

0 6 . 2

Explain why the blood glucose concentration of person A decreased after 30 minutes.

.....

.....

.....

.....

.....

[3 marks]

0 6 . 3

Use Figure 1 to give **two** differences between the results for person B and the results for person A.

.....

.....

.....

.....

[2 marks]

0 6 . 4

What should person B do to reduce their blood glucose concentration?

.....

.....

[1 mark]

END OF QUESTIONS

Original practice questions written to match the specification. Not produced by, affiliated with or endorsed by AQA.

Mark scheme

GCSE Combined Science: Trilogy · Worksheet: Control of blood glucose concentration · 31 marks

Question 1 (3 marks)

01.1 [2 marks]

Answer: 2.7 mmol/dm³

- 7.3 – 4.6 (1)
- 2.7 (mmol/dm³) (1)

Notes: Correct answer with no working scores 2 marks.

01.2 [1 mark]

Answer: Insulin

- insulin (1)
-

Question 2 (3 marks)

02.1 [2 marks]

Answer: 2.6 mmol/dm³

- 7.9 – 5.3 (1)
- 2.6 (mmol/dm³) (1)

Notes: Correct answer with no working scores 2 marks.

02.2 [1 mark]

Answer: Insulin

- insulin (1)
-

Question 3 (6 marks)

03.1 [1 mark]

Correct: Pancreas

03.2 [1 mark]

Answer: Insulin

- insulin (1)
-

03.3 [1 mark]

Answer: Glycogen

- glycogen (1)
-

Notes: Do not accept glucagon.

03.4 [1 mark]

Answer: The pancreas does not produce enough insulin

- the pancreas does not produce (enough) insulin (1)
-

Notes: Allow 'the insulin-producing cells in the pancreas are damaged / destroyed'. Do not accept 'body cells do not respond to insulin'.

03.5 [2 marks]

Correct: A carbohydrate-controlled diet; An exercise programme

Question 4 (5 marks)

04.1 [1 mark]

Answer: Type 1 diabetes

- Type 1 (diabetes) (1)
-

04.2 [1 mark]

Correct: The blood glucose concentration is uncontrolled and too high

04.3 [2 marks]

Correct: Insulin injections; Monitoring the blood glucose concentration regularly

04.4 [1 mark]

Answer: Obesity

- obesity / being (very) overweight (1)
-

Notes: Allow lack of exercise or a diet high in sugar or fat.

Question 5 (6 marks)

05.1 [2 marks]

Answer: 52.1%

- $(7.3 - 4.8) \div 4.8 \times 100$ (1)
- 52.1 (%) (1)

Notes: Correct answer with no working scores 2 marks. An answer not given to 3 significant figures scores 1 mark.

05.2 [2 marks]

Answer: 21.9%

- $(7.3 - 5.7) \div 7.3 \times 100$ (1)
- 21.9 (%) (1)

Notes: Correct answer with no working scores 2 marks. An answer not given to 3 significant figures scores 1 mark.

05.3 [2 marks]

Answer: The pancreas released insulin, which caused glucose to move from the blood into cells, where some was stored as glycogen

- the pancreas detects the (high) blood glucose concentration and releases insulin (1)
 - insulin causes glucose to move from the blood into cells / to be stored as glycogen (in the liver and muscles) (1)
-

Question 6 (8 marks)

06.1 [2 marks]

Answer: It rose to a peak of 140 mg per 100 cm³ at 30 minutes, then fell back to 85 mg per 100 cm³ by 120 minutes

- increased to a maximum / peak at 30 minutes / of 140 (mg per 100 cm³) (1)
- then decreased back to the starting value / to 85 (mg per 100 cm³) (by 120 minutes) (1)

06.2 [3 marks]

Answer: The pancreas detected the high glucose concentration and released insulin; insulin caused glucose to move from the blood into cells, where it was stored as glycogen in liver and muscle cells

- pancreas detects the high blood glucose concentration (1)
- (pancreas) releases / secretes insulin (into the blood) (1)
- (insulin) causes glucose to move from the blood into (body) cells (1)
- (in liver and muscle cells) glucose is converted to glycogen (for storage) (1)

Any 3 of the points above.

Notes: For the last point allow 'insulin causes glucose to be stored as glycogen in the liver / muscles'. Do not accept glucagon for glycogen.

06.3 [2 marks]

Answer: B starts at a higher concentration; B's concentration rises higher and peaks later; B's concentration does not return to its starting value within 180 minutes

- person B's concentration was higher at the start (1)
- person B's peak was higher / reached 280 compared with 140 (mg per 100 cm³) (1)
- person B's peak was later / at 90 minutes compared with 30 minutes (1)
- person B's concentration fell more slowly / did not return to the starting value (1)

Any 2 of the points above.

06.4 [1 mark]

Answer: Inject insulin

- inject insulin (1)

Notes: Allow 'take insulin'. Do not accept 'eat less sugar' alone.
