AQA GCSE Combined Science - Trilogy | 8464

SPECIFICATION POINT 4.4.2.2

Response to exercise

Past-paper questions

Tier	**Foundation**
Question groups	**7**
Available paper years	**2018–2025**

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.

4.4.2.2 Response to exercise

Question 01

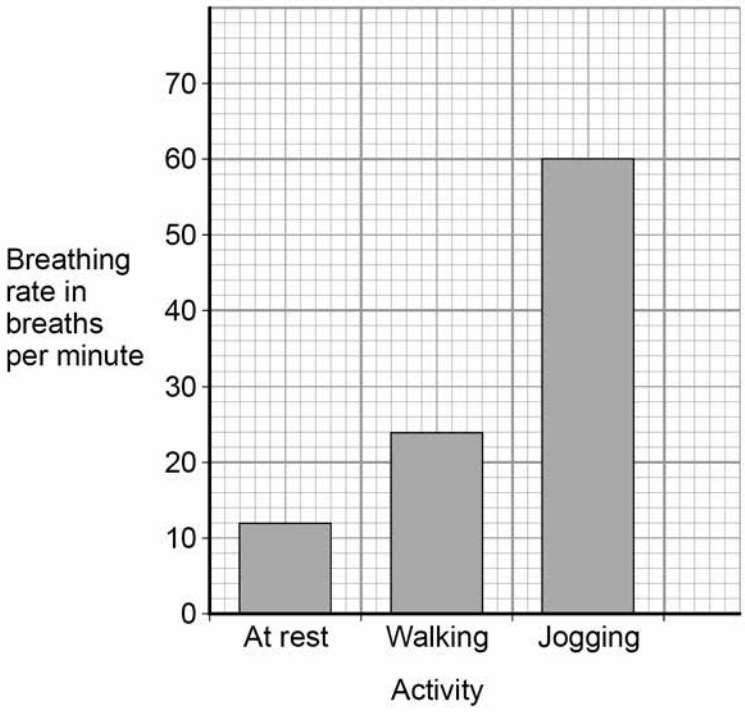
June 2018 | 8464/B/1F | Original Q4

0 4 Exercise can improve health.

A student measured her breathing rate at rest, when walking and when jogging.

Figure 8 shows her results.

Figure 8



0 4 . 1 Compare the breathing rates when doing the **three** different activities.

Use values from **Figure 8** in your answer.

[3 marks]

Question 4 continues on the next page

4.4.2.2 Response to exercise

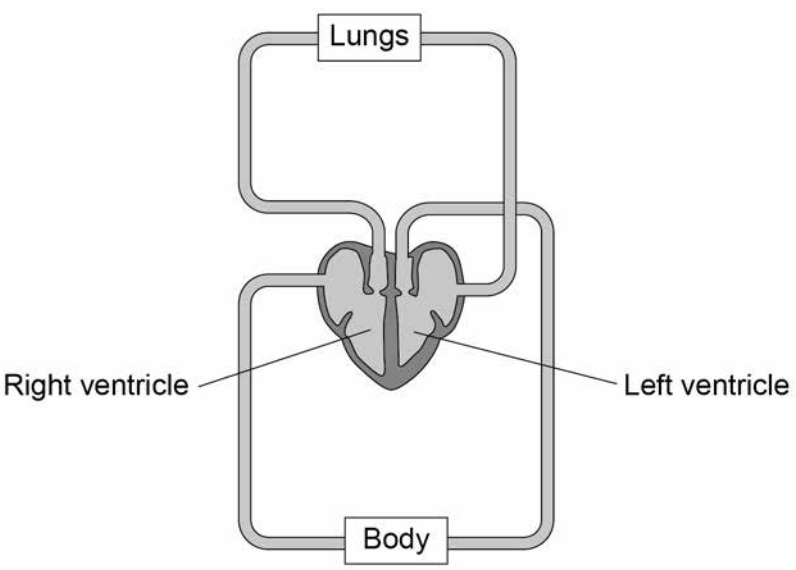
Question 01 · continued

0 4 . 2 Explain why the breathing rate changes when doing different activities.

[3 marks]

Figure 9 shows the heart in the circulatory system.

Figure 9



0 4 . 3 The heart is a double pump.

Describe what this means.

Use **Figure 9** to help you.

[2 marks]

4.4.2.2 Response to exercise

Question 01 · continued

0 4 . 4 The wall of the left ventricle is much thicker than the wall of the right ventricle.

Suggest **one** reason for this.

[1 mark]

0 4 . 5 People are encouraged to exercise after recovering from a heart attack.

Suggest **one** reason why.

[1 mark]

10

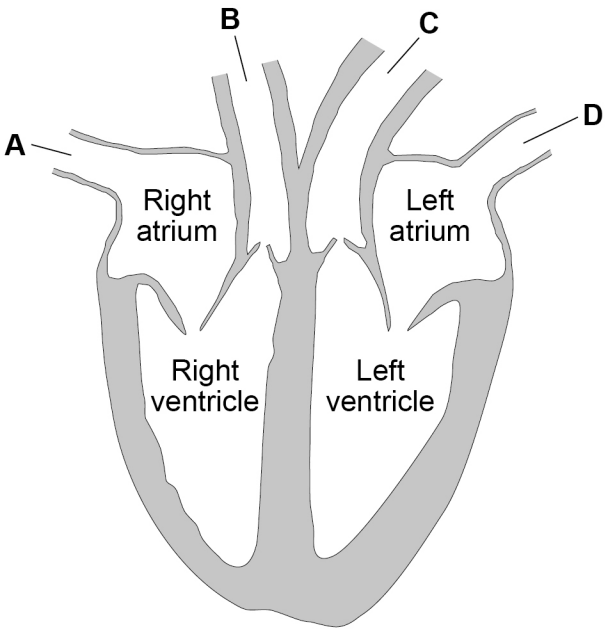
4.4.2.2 Response to exercise

Question 02

June 2019 | 8464/B/1F | Original Q6

0 6 **Figure 10** shows a human heart.

Figure 10



0 6 . 1 Which blood vessel carries deoxygenated blood away from the heart to the lungs?

[1 mark]

Tick (✓) **one** box.

A ☐ **B** ☐ **C** ☐ **D** ☐

0 6 . 2 The natural resting heart rate is controlled by a group of cells that act as a pacemaker.

Where in the heart are 'pacemaker cells' found?

[1 mark]

Tick (✓) **one** box.

Left atrium ☐

Left ventricle ☐

Right atrium ☐

Right ventricle ☐

4.4.2.2 Response to exercise

Question 02 · continued

Some people may be treated with a drug to slow their heart rate.

0 6 . 3 Digitalis is a drug that slows the heart rate.

Where does the drug digitalis originate from?

[1 mark]

Tick (✓) **one** box.

- Bacteria ☐
- Foxgloves ☐
- Mould ☐
- Willow ☐

Question 6 continues on the next page

4.4.2.2 Response to exercise

Question 02 · continued

Beta blockers are another type of drug that slows the heart rate.

Table 2 shows information for people who do not take beta blockers and for people who do take beta blockers.

- Stroke volume is the volume of blood pumped out of the heart each time it beats.
- Cardiac output is the total volume of blood pumped out of the heart each minute.

Table 2

	No beta blockers taken		Taking beta blockers	
	At rest	**During exercise**	**At rest**	**During exercise**
Heart rate in beats per minute	68	150	52	88
Stroke volume in cm^3	80	120	**X**	98
Cardiac output in cm^3 per minute	5440	18 000	2800	8624

0 6 . 4 Calculate stroke volume **X** in **Table 2**.

Use the equation:

cardiac output = stroke volume × heart rate

Give your answer to 2 significant figures.

[3 marks]

Stroke volume **X** = _____ cm^3

4.4.2.2 Response to exercise

Question 02 · continued

June 2019 | 8464/B/1F | Original Q6

0 6 . 5 Some people who take beta blockers get out of breath when they exercise.

Explain why beta blockers can have this effect during exercise.

You should refer to information given in **Table 2**.

[6 marks]

12

4.4.2.2 Response to exercise

Question 03

November 2020 | 8464/B/1F | Original Q1

0 1 Being overweight can affect the health and life expectancy of a person.

0 1 . 1 What is **one** lifestyle change a person could make to help them lose body mass?

[1 mark]

Tick (✓) **one** box.

Drink more alcohol ☐

Eat less fatty food ☐

Stop smoking ☐

0 1 . 2 Exercise has many health benefits.

Give **two** health benefits of regular exercise.

Do **not** refer to losing body mass in your answer.

[2 marks]

1 _____

_____

2 _____

_____

4.4.2.2 Response to exercise

Question 03 · continued

During exercise, breathing rate increases to provide more oxygen for aerobic respiration.

0 1 . 3 What is the equation for aerobic respiration?

[1 mark]

Tick (✓) **one** box.

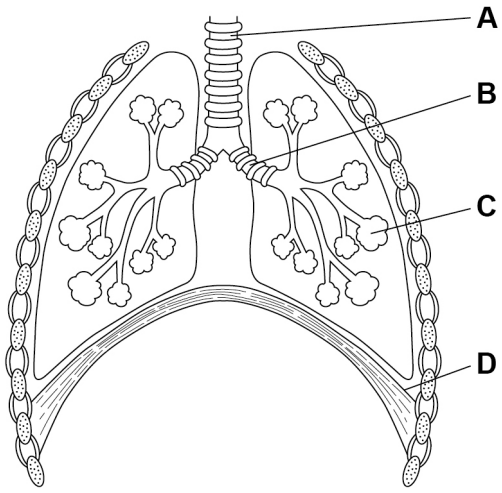
carbon dioxide + water → glucose + oxygen ☐

glucose + oxygen → carbon dioxide + water ☐

oxygen + water → glucose + carbon dioxide ☐

0 1 . 4 **Figure 1** shows the human breathing system.

Figure 1



Where does gas exchange take place?

[1 mark]

Tick (✓) **one** box.

A ☐ **B** ☐ **C** ☐ **D** ☐

4.4.2.2 Response to exercise

Question 03 · continued

A scientist investigated the effect of exercise on the breathing rate of four people.

This is the method used.

1. Measure the resting breathing rate.

2. Exercise for 10 minutes.

3. Measure the breathing rate as soon as exercise stops.

4. Record the time taken for the breathing rate to return to the resting rate.

Table 1 shows the results.

Table 1

Person	Resting breathing rate in breaths per minute	Breathing rate after exercise in breaths per minute	Increase in breathing rate in breaths per minute	Time for breathing rate to return to resting rate in minutes
A	12	45	33	5.5
B	10	28	18	4.0
C	11	35	24	6.5
D	13	52	39	10.0

0 1 . 5 The scientist concluded that person **B** was the fittest.

Give **two** reasons that support the scientist's conclusion.

Use **Table 1**.

[2 marks]

1 _____

_____

2 _____

_____

4.4.2.2 Response to exercise

Question 03 · continued

0 1 . 6 Suggest **two** reasons why the scientist's conclusion may **not** be valid.

[2 marks]

1 _____

_____

2 _____

_____

0 1 . 7 Give **two** changes that happen in the body during aerobic exercise.

Do **not** refer to increased breathing rate in your answer.

[2 marks]

1 _____

_____

2 _____

_____

0 1 . 8 Muscles respire anaerobically during vigorous exercise.

Complete the sentences.

Choose answers from the box.

[2 marks]

amino acids	**carbon dioxide**	**glucose**
lactic acid	**oxygen**	

Muscles respire anaerobically if they do not have

enough _____ .

Anaerobic respiration of glucose produces _____ .

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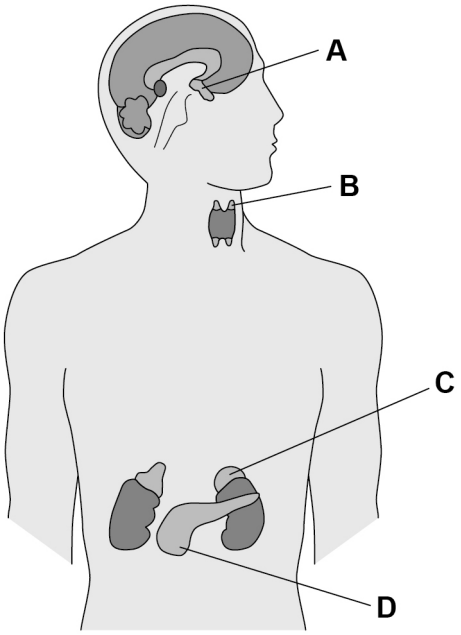
4.4.2.2 Response to exercise

Question 04

0 4 The endocrine system is made up of glands which secrete hormones.

Figure 5 shows the position of endocrine glands in the human body.

Figure 5



0 4 . 1 Which letter shows the pancreas?

[1 mark]

Tick (✓) **one** box.

A ☐ **B** ☐ **C** ☐ **D** ☐

0 4 . 2 Which letter shows the thyroid gland?

[1 mark]

Tick (✓) **one** box.

A ☐ **B** ☐ **C** ☐ **D** ☐

4.4.2.2 Response to exercise

Question 04 · continued

0 4 . 3 Hormones travel from the gland where they are made to the target organ where they have an effect.

How do hormones travel from the gland to the target organ?

[1 mark]

When blood glucose concentration becomes too high, hormone **X** from the pancreas causes a decrease in the glucose concentration.

0 4 . 4 Name hormone **X**.

[1 mark]

0 4 . 5 In what **two** ways does hormone **X** cause a decrease in blood glucose concentration?

[2 marks]

Tick (✓) **two** boxes.

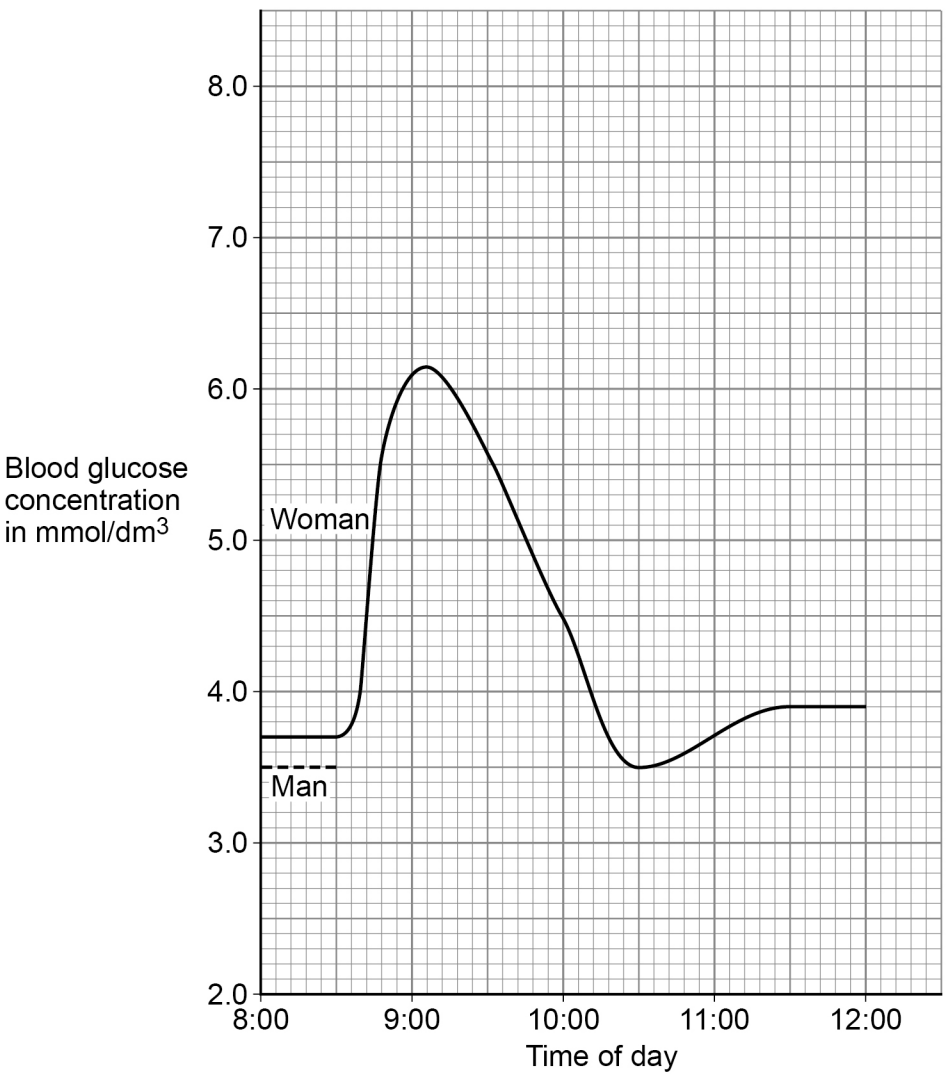
- Glucose is broken down. ☐
- Glucose is converted to glycogen. ☐
- Glucose is excreted by the kidneys. ☐
- Glucose moves from the blood into the cells. ☐
- Glucose moves into the small intestine. ☐

4.4.2.2 Response to exercise

Question 04 · continued

Figure 6 shows the blood glucose concentration in a woman.

Figure 6



0 4 . 6 Suggest what time of day the woman ate her breakfast of sugar-coated cereal.

[1 mark]

Time of day = _____

4.4.2.2 Response to exercise

Question 04 · continued

The man in **Figure 6** has Type 2 diabetes but he has **not** been treated.

0 4 . 7 The man ate:

- the same type and amount of breakfast cereal as the woman
- at the same time as the woman.

Suggest what his blood glucose concentration would be at 9:00

[1 mark]

Blood glucose concentration = _____ $mmol/dm^3$

0 4 . 8 The man:

- is an obese office worker
- does not exercise
- eats sugary snacks at his desk.

Give **two** lifestyle changes a doctor might recommend to the man to help him control his diabetes.

[2 marks]

1 _____

_____

2 _____

_____

0 4 . 9 Describe how a **low** blood glucose concentration would lead to a person feeling weak.

[2 marks]

_____

_____

_____

_____

12

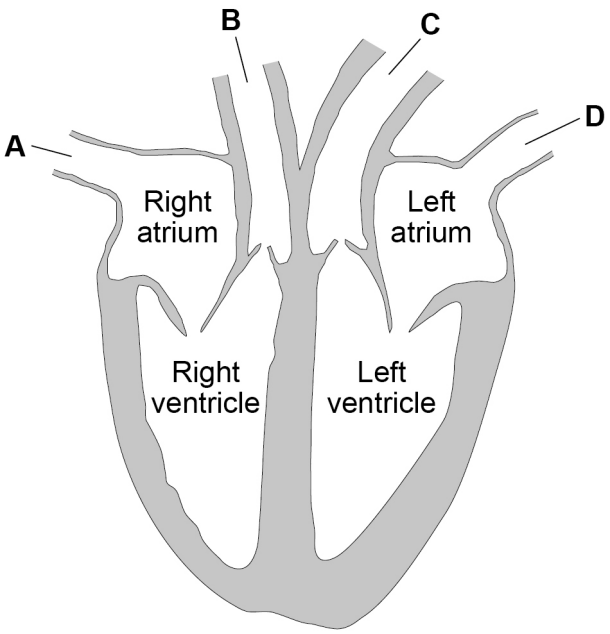
4.4.2.2 Response to exercise

Question 05

June 2023 | 8464/B/1F | Original Q4

0 4 **Figure 6** shows a human heart.

Figure 6



0 4 . 1 The vena cava carries blood into the heart from the body.

Which blood vessel in **Figure 6** is the vena cava?

[1 mark]

Tick (✓) **one** box.

A ☐ **B** ☐ **C** ☐ **D** ☐

4.4.2.2 Response to exercise

Question 05 · continued

0 4 . 2 Which chamber of the heart pumps blood to the body?

[1 mark]

Tick (✓) **one** box.

- Left atrium ☐
- Left ventricle ☐
- Right atrium ☐
- Right ventricle ☐

0 4 . 3 What is the name of the blood vessel that carries blood to the heart muscle?

[1 mark]

Tick (✓) **one** box.

- Aorta ☐
- Coronary artery ☐
- Pulmonary artery ☐

Question 4 continues on the next page

4.4.2.2 Response to exercise

Question 05 · continued

The heart and some blood vessels contain valves.

0 4 . 4 Which type of blood vessel has valves?

[1 mark]

Tick (✓) **one** box.

- Artery ☐
- Capillary ☐
- Vein ☐

0 4 . 5 What is the function of valves?

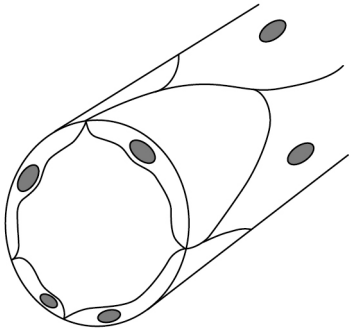
[1 mark]

4.4.2.2 Response to exercise

Question 05 · continued

Figure 7 shows a blood capillary.

Figure 7



0 4 . 6 Explain **one** way the capillary is adapted for its function.

[2 marks]

Question 4 continues on the next page

4.4.2.2 Response to exercise

Question 05 · continued

Table 2 shows information about the blood of four people.

Table 2

Person	Concentration of blood component in number/mm^3		
	Red blood cells	White blood cells	Platelets
W	5 000 000	15 000	200 000
X	4 700 000	5 500	20 000
Y	8 000 000	7 200	250 000
Z	4 900 000	6 400	225 000

0 4 . 7 Person **W** has 5 000 000 red blood cells in 1 mm^3 of blood.

What is 5 000 000 written in standard form?

[1 mark]

Tick (✓) **one** box.

5 × 1 000 000 ☐

5 × 10^6 ☐

5 × 10^7 ☐

50 × 10^5 ☐

4.4.2.2 Response to exercise

Question 05 · continued

0 4 . 8 Draw **one** line from each description to the person in **Table 2** it describes.

[2 marks]

Description	Person in Table 2
	Person **W**
Person most likely to have an infection	Person **X**
Person whose blood will **not** clot properly	Person **Y**
	Person **Z**

Question 4 continues on the next page

4.4.2.2 Response to exercise

Question 05 · continued

0 4 . 9 The greater the height above sea level, the less oxygen there is in the air.

People who live high above sea level have more red blood cells than people who live at sea level.

Some athletes train in mountains high above sea level.

Explain why having more red blood cells will improve an athlete's performance.

[3 marks]

13

4.4.2.2 Response to exercise

Question 06

June 2023 | 8464/B/1F | Original Q6

0 6 Communicable and non-communicable diseases are major causes of ill health.

0 6 . 1 Which disease is a **non-communicable** disease?

[1 mark]

Tick (✓) **one** box.

- AIDS ☐
- Cancer ☐
- Gonorrhoea ☐
- Malaria ☐

Obesity is a risk factor for many non-communicable diseases.

0 6 . 2 Give **one** non-communicable disease that obesity is a risk factor for.

Do **not** refer to the diseases given in Question **06.1** in your answer.

[1 mark]

0 6 . 3 National policies are used to help people who are obese to lose weight.

One national policy is to reduce the amount of sugar added to food and drinks.

Suggest **one other** national policy that could help people to lose weight.

[1 mark]

4.4.2.2 Response to exercise

Question 06 · continued

0 6 . 4 Body mass index (BMI) is one measure of obesity.

BMI is calculated using the equation:

$$\text{BMI} = \frac{\text{body mass in kg}}{(\text{height in m})^2}$$

Table 4 shows how BMI is used to describe an adult's BMI category.

Table 4

BMI	BMI category
<18.5	Underweight
18.5 to 24.9	Healthy weight
25.0 to 29.9	Overweight
>29.9	Obese

A person is 1.64 m tall and has a mass of 69 kg.

Determine the **BMI category** for this person.

Use the BMI equation and **Table 4**.

[3 marks]

The person's BMI category is _____

Question 6 continues on the next page

4.4.2.2 Response to exercise

Question 06 · continued

Scientists investigated the effect of smoking and of BMI on the birth mass of babies.

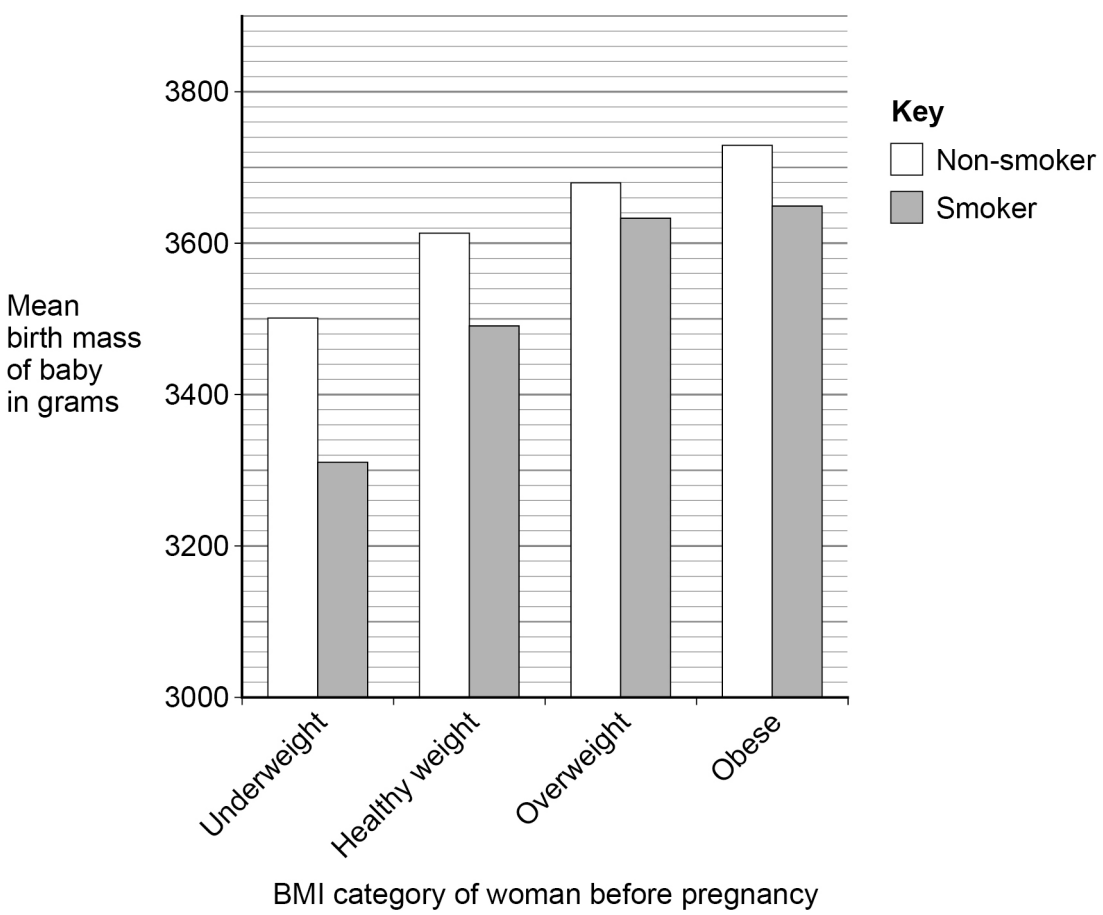
Women's BMI categories were determined before the women became pregnant.

0 6 . 5 Suggest why BMI categories were determined **before** the women became pregnant.

[1 mark]

Figure 9 shows the results.

Figure 9



4.4.2.2 Response to exercise

Question 06 · continued

0 6 . 6 Give **two** conclusions that can be made from **Figure 9**.

[2 marks]

1 _____

_____

2 _____

_____

0 6 . 7 Measles is a communicable disease.

A virus causes measles.

Describe how the measles virus is transferred from person to person.

[2 marks]

_____

_____

_____

_____

Question 6 continues on the next page

4.4.2.2 Response to exercise

Question 06 · continued

Athlete's foot is a communicable disease.

A fungus causes athlete's foot.

The athlete's foot fungus infects the skin on feet.

0 6 . 8 Scientists estimate that 17% of the UK population have athlete's foot.

The estimated UK population is 67 961 900

Calculate how many people are estimated to have athlete's foot.

[2 marks]

Estimated number of people with athlete's foot = _____

0 6 . 9 Athlete's foot fungus grows in moist conditions.

Suggest **one** way a person could reduce their chance of catching athlete's foot.

[1 mark]

14

4.4.2.2 Response to exercise

Question 07

June 2025 | 8464/B/1F | Original Q4

0 4 This question is about exercise.

0 4 . 1 Which **two** substances do muscles need during exercise?

[2 marks]

Tick (✓) **two** boxes.

- Carbon dioxide ☐
- Glucose ☐
- Lactic acid ☐
- Oxygen ☐
- Urea ☐

Question 4 continues on the next page

4.4.2.2 Response to exercise

Question 07 · continued

Two people exercised on running machines.

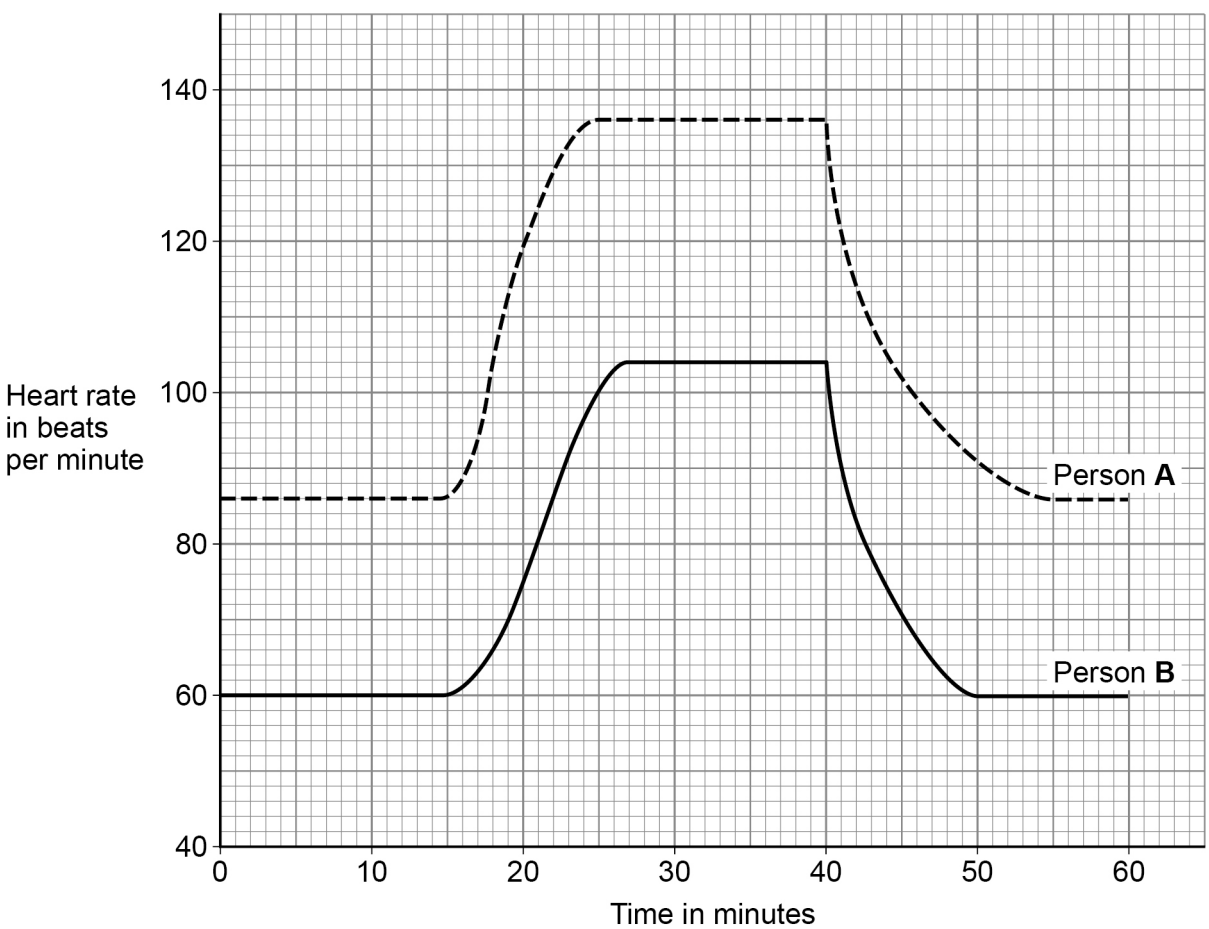
The two people ran at the same speed.

Each person's heart rate was monitored:

- before exercising
- while exercising
- after they stopped exercising.

Figure 8 shows the results.

Figure 8



0 4 . 2 How many minutes did person **B** exercise for?

[2 marks]

Number of minutes = _____

4.4.2.2 Response to exercise

Question 07 · continued

0 4 . 3 Calculate the percentage increase in heart rate for person **B** during the exercise.

Use the equation:

$$\text{percentage increase} = \frac{\text{maximum heart rate} - \text{resting heart rate}}{\text{resting heart rate}} \times 100$$

Give your answer to 2 significant figures.

[3 marks]

Percentage increase (2 significant figures) = _____ %

0 4 . 4 A student stated:

'Person **B** is fitter than person **A**.'

Give **two** pieces of evidence to support the student's statement.

Use **Figure 8**.

[2 marks]

1 _____

2 _____

Question 4 continues on the next page

4.4.2.2 Response to exercise

Question 07 · continued

Immediately after exercise, the concentration of lactic acid in the blood of the two people was measured.

Table 5 shows the results.

Table 5

	Concentration of lactic acid in arbitrary units
Person **A**	22
Person **B**	4

0 4 . 5 Complete the bar chart in **Figure 9**.

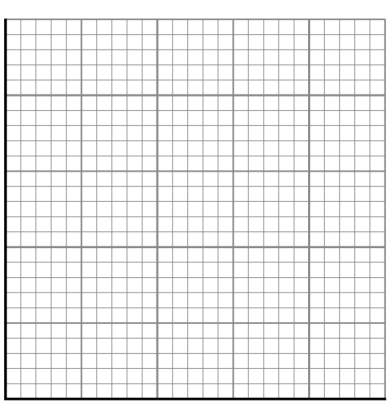
You should:

- use a suitable scale for the *y*-axis
- plot the data from **Table 5**
- label each bar.

[3 marks]

Figure 9

Concentration of lactic acid in arbitrary units



4.4.2.2 Response to exercise

Question 07 · continued

0 4 . 6 The concentration of lactic acid in the blood of person **A** is proportional to the intensity of the exercise.

Which symbol means 'proportional to'?

[1 mark]

Tick (✓) **one** box.

~ ☐

> ☐

∝ ☐

13

Turn over for the next question