AQA GCSE Combined Science - Trilogy | 8464

SPECIFICATION POINT 4.4.2.1

Aerobic and anaerobic respiration

Past-paper questions

Tier	**Higher**
Question groups	**4**
Available paper years	**2020–2025**

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.

4.4.2.1 Aerobic and anaerobic respiration

Question 01

November 2020 | 8464/B/1H | Original Q3

0 3 Being overweight can affect the health and life expectancy of a person.

0 3 . 1 Give **one** disease related to being overweight.

[1 mark]

0 3 . 2 Body mass index (BMI) helps to show if a person has a healthy body mass for their height.

BMI is calculated using the equation:

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

A woman has a BMI of 27 and a body mass of 68.1 kg

Calculate the woman's height in metres.

[3 marks]

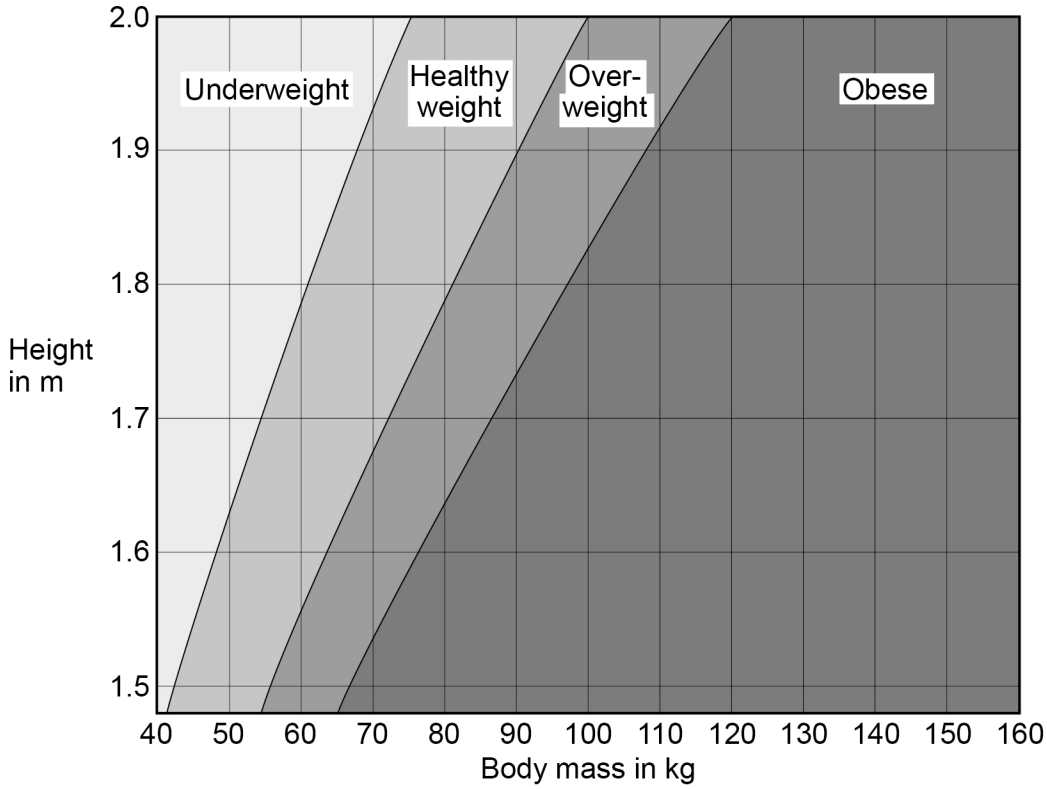
Height = _____ m

4.4.2.1 Aerobic and anaerobic respiration

Question 01 · continued

0 3 . 3 **Figure 4** shows a height-body mass chart for adults.

Figure 4



Which weight category describes the woman in Question **03.2**?

[1 mark]

Tick (✓) **one** box.

Underweight ☐

Healthy weight ☐

Overweight ☐

Obese ☐

4.4.2.1 Aerobic and anaerobic respiration

Question 01 · continued

0 3 . 4 People are encouraged to control their body mass with diet and exercise.

Describe how the balance between the mass of food eaten and the amount of exercise a person does controls body mass.

[3 marks]

4.4.2.1 Aerobic and anaerobic respiration

Question 01 · continued

0 3 . 5 During long periods of vigorous exercise the body respires anaerobically.

Explain the changes that happen in the body during **and** after vigorous exercise.

[6 marks]

14

4.4.2.1 Aerobic and anaerobic respiration

Question 02

November 2020 | 8464/B/2H | Original Q6

0 6 Scientists believe that the first life on Earth was primitive anaerobic bacteria which first appeared billions of years ago.

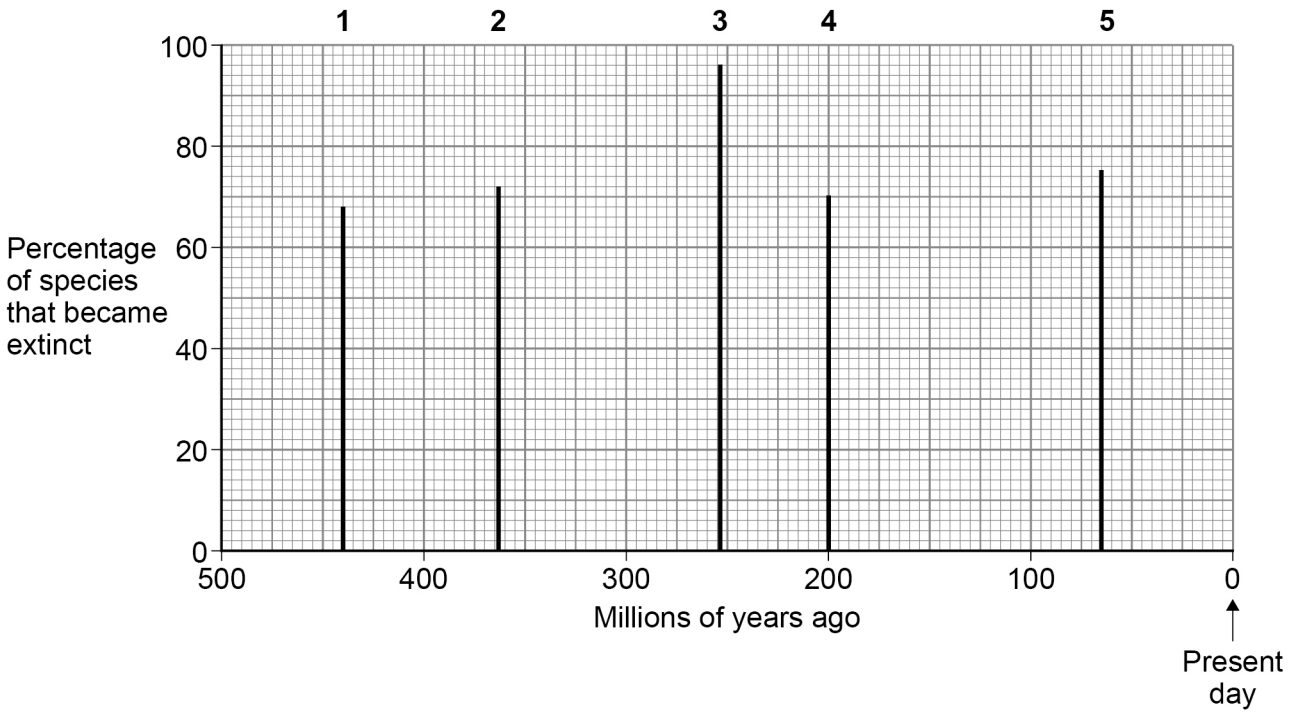
0 6 . 1 Which domain of the three-domain classification system do these primitive anaerobic bacteria belong to?

[1 mark]

Scientists have identified five periods of mass extinction since the fossil record began.

Figure 6 shows the timeline of the five mass extinction events.

Figure 6



0 6 . 2 Ammonites were organisms that first appeared in the oceans 415 million years ago.

Ammonites disappeared in the 5th mass extinction.

Draw a horizontal line on **Figure 6** to show the time period that ammonites existed on Earth.

Label the line 'ammonites'.

[1 mark]

4.4.2.1 Aerobic and anaerobic respiration

Question 02 · continued

0 6 . 3 Another type of organism that existed in the oceans was called trilobites.

Trilobites existed from 544 million years ago until 278 million years ago.

How many more years did ammonites exist than trilobites?

[2 marks]

_____ years

0 6 . 4 There was an increase in the percentage of species which became extinct in the third mass extinction compared to the first mass extinction.

Calculate the percentage increase.

[3 marks]

Percentage increase = _____ %

7

4.4.2.1 Aerobic and anaerobic respiration

Question 03

November 2021 | 8464/B/1H | Original Q3

0 3 Fermentation in yeast is used in the manufacture of bread and alcoholic drinks.

The equation for fermentation is:

glucose → ethanol + carbon dioxide

0 3 . 1 Fermentation is an exothermic reaction.

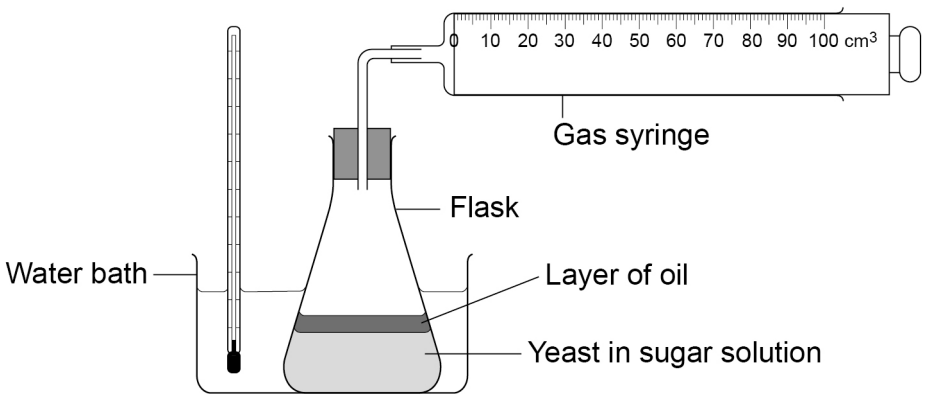
What does exothermic mean?

[1 mark]

A student investigated the effect of temperature on fermentation in yeast.

Figure 3 shows the apparatus.

Figure 3



4.4.2.1 Aerobic and anaerobic respiration

Question 03 · continued

This is the method used.

1. Mix yeast with sugar solution in a flask.
2. Pour a layer of oil over the surface of the mixture.
3. Put the flask in a water bath at 2 °C and leave for 20 minutes.
4. Attach a gas syringe.
5. Record the volume of gas collected every 5 minutes for 30 minutes.
6. After 30 minutes move the flask to a water bath at 35 °C.
7. Continue to record the volume of gas collected every 5 minutes.

0 3 . 2 Suggest why a layer of oil was needed on the surface of the mixture.

[1 mark]

0 3 . 3 Suggest why the mixture was left for 20 minutes before the gas syringe was attached.

[1 mark]

Question 3 continues on the next page

Question 03 · continued

Steps 1 to 4 of the method were repeated at 35 °C.

The volume of gas collected was recorded every 5 minutes for 45 minutes.

Table 2 shows the results for both flasks for the first 30 minutes.

Table 3 shows the results for the last 15 minutes, when both flasks were at 35 °C.

Table 2

Time in minutes	Volume of gas collected in cm^3	
	Flask at 2 °C	Flask at 35 °C
0	0	0
5	0	26
10	0	52
15	0	78
20	0	98
25	0	108
30	0	115

Table 3

Time in minutes	Volume of gas collected in cm^3	
	Flask at 2 °C moved to 35 °C	Flask kept at 35 °C
35	2	120
40	7	123
45	22	124

4.4.2.1 Aerobic and anaerobic respiration

Question 03 · continued

0 3 . 4 Explain the results from 0 minutes to 45 minutes for the flask that was at 2 °C and was then moved to 35 °C.

Use **Table 2** and **Table 3**.

[3 marks]

0 3 . 5 Explain the results from 0 minutes to 45 minutes for the flask kept at 35 °C.

Use **Table 2** and **Table 3**.

[4 marks]

10

4.4.2.1 Aerobic and anaerobic respiration

Question 04

June 2025 | 8464/B/1H | Original Q5

0 5 This question is about plants.

0 5 . 1 Some plants can respire anaerobically.

Which are the **two** products of anaerobic respiration in plants?

[2 marks]

Tick (✓) **two** boxes.

- Carbon dioxide ☐
- Ethanol ☐
- Glucose ☐
- Lactic acid ☐
- Water ☐

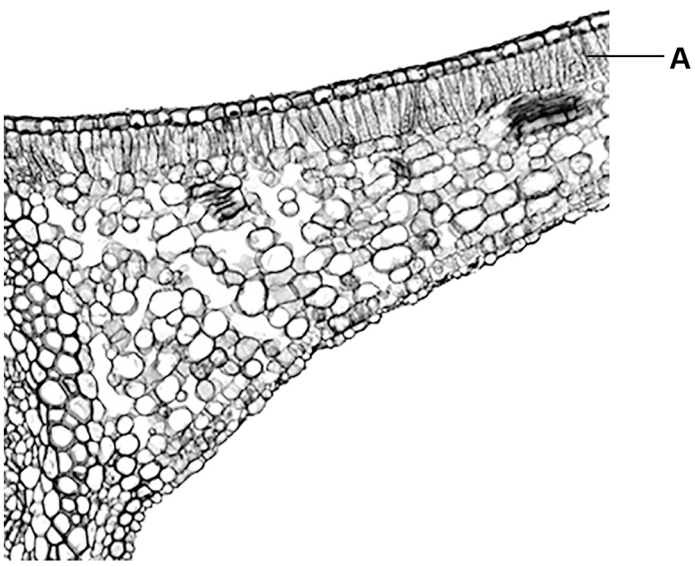
Question 5 continues on the next page

4.4.2.1 Aerobic and anaerobic respiration

Question 04 · continued

Figure 6 shows the structure of part of a leaf

Figure 6



0 5 . 2 What is the name of tissue **A**?

[1 mark]

0 5 . 3 Explain how tissue **A** is adapted to its function.

[2 marks]

4.4.2.1 Aerobic and anaerobic respiration

Question 04 · continued

0 5 . 4 Plants absorb water from the soil.

Describe how water is transported from the soil through plant tissues to the atmosphere.

[5 marks]

Extra space

10