

GCSE Combined Science: Trilogy

Worksheet: Aerobic and anaerobic respiration

TIME 35 min	TOTAL 32 marks	CALCULATOR Allowed	DIFFICULTY Easy, Medium
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Topics: Aerobic and anaerobic respiration

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

Respiration takes place continuously in all living cells.

0 1 . 1

Complete the word equation for aerobic respiration.

glucose + oxygen → +

.....

.....

.....

.....

[2 marks]

0 1 . 2

In which part of a cell does most aerobic respiration take place?

Tick (✓) **one** box.

Chloroplast

☐

Mitochondrion

☐

Nucleus

☐

Ribosome

☐

[1 mark]

0 1 . 3

Respiration is an exothermic reaction.
What does exothermic mean?

.....

.....

[1 mark]

0 1 . 4

What name is given to respiration that takes place without oxygen?

.....

.....

.....

.....

[1 mark]

0 2

Aerobic respiration happens in all living cells. Some cells can also respire anaerobically.

0 2 . 1

Give the word equation for anaerobic respiration in human muscle cells.

.....

.....

[1 mark]

0 2 . 2

Give the word equation for anaerobic respiration in yeast cells.

.....

.....

[1 mark]

0 2 . 3

Which statement correctly compares anaerobic respiration in muscles with anaerobic respiration in yeast?

Tick (✓) **one** box.

- Both anaerobic processes produce carbon dioxide. ☐
- Both anaerobic processes produce ethanol. ☐
- Both anaerobic processes need a small amount of oxygen. ☐
- Both anaerobic processes transfer less energy than aerobic respiration. ☐

[1 mark]

0 3

Organisms need the energy transferred by respiration.

0 3 . 1

Give **three** uses of the energy transferred by respiration in animals.

.....

.....

.....

.....

.....

.....

[3 marks]

0 3 . 2

Complete the word equation for anaerobic respiration in muscles.
glucose →

.....

.....

.....

[1 mark]

0 3 . 3

Which statement about anaerobic respiration in muscles is correct?

Tick (✓) **one** box.

It needs oxygen.

☐

It produces carbon dioxide.

☐

It transfers less energy than aerobic respiration.

☐

It takes place in chloroplasts.

☐

[1 mark]

0 4

A student investigated the effect of temperature on the rate of respiration of yeast. The student added a layer of oil on top of a mixture of yeast and glucose solution, then measured the volume of carbon dioxide produced in 10 minutes at different temperatures.

Table 1 shows the results.

Table 1

Temperature in °C	Volume of CO ₂ in cm ³ : trial 1	Trial 2	Trial 3	Mean volume in cm ³
15	4.2	3.8	4.0	4.0
25	9.1	8.7	9.2	9.0
35	15.8	16.4	16.1	X
45	11.9	12.5	12.2	12.2
55	1.1	0.8	0.9	0.9

0 4 . 1

Calculate value X.

.....

.....

.....

X = cm³

[1 mark]

0 4 . 2

Calculate the mean rate of carbon dioxide production at 35 °C.
Give your answer in cm³ per minute.

.....

.....

.....

Rate = cm³ per minute
[1 mark]

0 4 . 3

Explain the change in the rate of respiration between 35 °C and 55 °C.

.....

.....

.....

.....

.....

.....

[3 marks]

0 4 . 4

Suggest how the student could find the optimum temperature more precisely.

.....

.....

[1 mark]

0 4 . 5

Suggest why the student added a layer of oil on top of the yeast mixture.

.....

.....

.....

.....

[2 marks]

0 5

A person with a mass of 75 kg used 25.2 dm³ of oxygen in 12 minutes of steady exercise.

0 5 . 1

Calculate the person's rate of oxygen use, in dm³ per minute.

.....

.....

.....

.....

Rate = dm³ per minute

[2 marks]

0 5 . 2

Calculate the person's rate of oxygen use per kg of body mass, in cm³ per kg per minute.

Give your answer to 3 significant figures. (1 dm³ = 1000 cm³)

.....

.....

.....

.....

Rate = cm³ per kg per minute

[2 marks]

0 6

Yeast is a single-celled fungus that can respire anaerobically.

0 6 . 1

Complete the word equation for anaerobic respiration in yeast.

glucose → +

.....

.....

.....

.....

[2 marks]

0 6 . 2

What name is given to anaerobic respiration in yeast?

.....

.....

.....

.....

[1 mark]

0 6 . 3

Explain why yeast is used in bread-making.

.....

.....

.....

.....

[2 marks]

0 6 . 4

Explain why yeast is used to make alcoholic drinks.

.....

.....

[1 mark]

0 6 . 5

Anaerobic respiration also takes place in plant cells.
Suggest when the cells in plant roots might respire anaerobically.

.....

.....

[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: Aerobic and anaerobic respiration · 32 marks

Question 1 (5 marks)

01.1 [2 marks]

Answer: glucose + oxygen → carbon dioxide + water

- carbon dioxide (1)
 - water (1)
-

01.2 [1 mark]

Correct: Mitochondrion

01.3 [1 mark]

- energy is transferred to the surroundings (1)
-

01.4 [1 mark]

Answer: Anaerobic respiration

- anaerobic (respiration) (1)
-

Question 2 (3 marks)

02.1 [1 mark]

- glucose → lactic acid (1)
-

02.2 [1 mark]

- glucose → ethanol + carbon dioxide (1)
-

02.3 [1 mark]

Correct: Both anaerobic processes transfer less energy than aerobic respiration.

Question 3 (5 marks)

03.1 [3 marks]

- chemical reactions to build larger molecules (1)
- movement / muscle contraction (1)
- keeping warm (1)
- active transport (1)

Any 3 of the points above.

03.2 [1 mark]

Answer: lactic acid

- lactic acid (1)

03.3 [1 mark]

Correct: It transfers less energy than aerobic respiration.

Question 4 (8 marks)

04.1 [1 mark]

Answer: 16.1 cm³

- 16.1 (cm³) (1)

04.2 [1 mark]

Answer: 1.61 cm³ per minute

- 1.61 (cm³ per minute) (1)

Notes: Allow ECF from the previous part.

04.3 [3 marks]

- the rate decreases above (about) 35 °C / the optimum temperature (1)
- the enzymes that control respiration are denatured (1)
- the shape of the active site changes, so the substrate no longer fits (1)

04.4 [1 mark]

- repeat using smaller temperature intervals between 25 °C and 45 °C, e.g. every 2 °C (1)

04.5 [2 marks]

- to stop oxygen (from the air) dissolving in the mixture (1)
 - (so) the yeast respire anaerobically / ferments (1)
-

Question 5 (4 marks)

05.1 [2 marks]

Answer: 2.1 dm³ per minute

- 25.2 ÷ 12 (1)
 - 2.1 (dm³ per minute) (1)
-

05.2 [2 marks]

Answer: 28.0 cm³ per kg per minute

- 2.1 × 1000 ÷ 75 (1)
- 28.0 (cm³ per kg per minute) (1)

Notes: Allow ECF from an incorrect rate of oxygen use.

Question 6 (7 marks)

06.1 [2 marks]

Answer: glucose → ethanol + carbon dioxide

- ethanol (1)
 - carbon dioxide (1)
-

06.2 [1 mark]

Answer: Fermentation

- fermentation (1)
-

06.3 [2 marks]

- yeast produces carbon dioxide (gas) (1)
 - (the gas) makes the dough rise (1)
-

06.4 [1 mark]

- it produces ethanol / alcohol (1)
-

06.5 [1 mark]

- when the soil is waterlogged / flooded (so there is little oxygen) (1)
-