Aerobic and anaerobic respiration

Student activity • observation and reasoning

YEAR 10 / LESSON 21 / BIOLOGY + SCIENCE (DOUBLE AWARD)

The question

How do the requirements and products of respiration differ?

Use the supplied examples, record your reasoning and correct it using evidence.

Equipment

- Student booklet, paper models, pencil and ruler

Paper, modelling and written reasoning only. No chemicals or biological samples are handled.

Course coverage: Shared Biology / Double Award: 2.36–2.38. Respiration pathways.

Plan, model or apparatus sketch

Draw and label the apparatus or biological model; identify one limitation.

Method and reasoning

Read the whole sequence before starting

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1. Write the word equation for aerobic respiration and identify glucose and oxygen as reactants, carbon dioxide and water as products.

2. Balance $C_6H_{12}O_6 + O_2 \rightarrow CO_2 + H_2O$ by counting each type of atom. Put energy transfer in the explanation, not as a chemical element.

3. Write the word equation for anaerobic respiration in muscle: glucose → lactic acid. Explain that it yields less ATP per glucose than aerobic respiration.

4. Write the word equation for fermentation in yeast and plant cells: glucose → ethanol + carbon dioxide.

5. Compare oxygen requirement, products and relative ATP yield. Do not use the absence of oxygen as proof that an organism is dead.

6. Plan evidence for the seed investigation: distinguish evidence of carbon dioxide production from evidence of heat transfer.

Cleanup

- Return models and keep the corrected work.

Record your evidence

Blank spaces are for your own work

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Reference and task data

Aerobic respiration: glucose + oxygen → carbon dioxide + water. Anaerobic respiration in muscles produces lactic acid (lactate under cell conditions); yeast fermentation produces ethanol and carbon dioxide. Both aerobic and anaerobic processes can supply ATP, but anaerobic processes provide a smaller yield per glucose.

Example / trial	Observation / evidence	Explanation / limit
Aerobic equation		
Muscle / yeast comparison		
Evidence for gas and heat		

Show your calculations, labelled model or correction here.

Explain and evaluate

Use evidence and show calculation steps where relevant

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1. Balance the aerobic respiration equation.

2. Does respiration occur only when an organism is visibly moving?

3. Name the products of yeast fermentation.

4. Name the product specified for anaerobic respiration in muscle.

5. Which pathway supplies more ATP per glucose?

6. Why would gas production alone not measure heat release?