

Cell respiration · supported focus

Supported focus · HL

Supported scope

- Supported HL focus. First assessment 2025; current subject brief acquired; full Biology guide not acquired. Remaining guide, assessment and practical requirements retain their recorded holds.
- State model conditions and distinguish fictional data from measurements.

Respiration · 1.1

Reasoning

A muscle can use oxygen while you exercise without producing a flame. Respiration transfers energy through a controlled series of reactions. Start with a prediction. State the quantities or features you would compare, then decide what evidence could distinguish two explanations.

Respiration · 2.1

Reasoning

Aerobic respiration uses oxygen and releases carbon dioxide and water from organic substrates. Energy released can support ATP formation. ATP hydrolysis can be coupled to processes such as active transport and muscle contraction.

respiration: Cell reactions that transfer energy from substrates; ATP: A molecule that couples energy transfers in cells.

Respiration · 3.1

Reasoning

Anaerobic processes allow ATP production when oxygen supply cannot support the required aerobic rate, but give less ATP per glucose. In humans lactate can accumulate; yeast can produce ethanol and carbon dioxide. A respirometer can measure oxygen uptake when carbon dioxide is absorbed. Control temperature with a water bath and use a comparison containing inert material. Keep absorbent separated from organisms and follow the school risk assessment.

Respiration · 4.1

Reasoning

State the known values and their units. Choose the relation because its assumptions fit this case, then rearrange before substitution. Known: oxygen uptake is 0.80 cubic centimetres in 4.0 minutes for 2.0 g of tissue. Rate per mass = volume / (time $\times$ mass). Rate = $0.80 / (4.0 \times 2.0) = 0.10$ cubic centimetres per minute per gram. Normalizing allows a fairer comparison of samples of different mass.

Respiration · 4.2

Reasoning

0.60 cubic centimetres are used in 3.0 minutes by 2.0 g of tissue. Find the mass-specific rate. Use the same sequence: known quantities $\rightarrow$ model $\rightarrow$ relation $\rightarrow$ substitution $\rightarrow$ unit and interpretation.

Respiration · 5.1

Reasoning

Breathing ventilates the lungs; respiration consists of chemical reactions in cells. A moving respirometer marker can also reflect temperature or pressure changes. Return to the original observation. Explain what the result supports, which conditions it assumes, and one way to test a competing explanation.

Respiration · 5.2

Reasoning

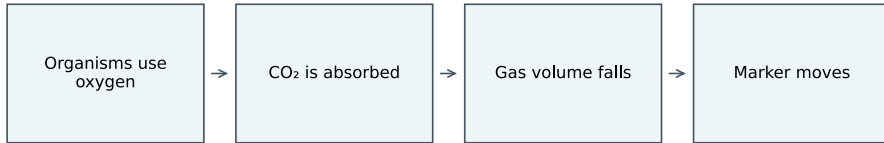
Breathing and cellular respiration are the same process. This claim is false: Breathing ventilates the lungs; respiration consists of chemical reactions in cells. A moving respirometer marker can also reflect temperature or pressure changes.

Respiration · 5.3

Reasoning

Respiration, ATP and energy transfers: Anaerobic processes allow ATP production when oxygen supply cannot support the required aerobic rate, but give less ATP per glucose. In humans lactate can accumulate; yeast can produce ethanol and carbon dioxide.

Respiration · diagram



- Original teaching diagram: Respiration, ATP and energy transfers
- Use the labels and the stated model together.

Respiration · original transfer

Your turn

Fictional samples use 0.8 cm^3 in 4 min for 2 g and 0.6 cm^3 in 3 min for 1 g. Compare mass-specific uptake and specify one control.

Respiration · transfer reasoning

Method and interpretation

0.10 and 0.20 cm³/(min g). The second is twice as high after normalization. Control temperature and pressure changes with a suitable comparison; uptake is not the same measurement as breathing rate.

Check yourself

- Explain respiration using the stated model.
- Explain ATP using the stated model.
- Change one value in the original transfer; explain which assumption still matters.