Review: nutrition and gas exchange

Student activity • observation and reasoning

YEAR 10 / LESSON 58 / BIOLOGY + SCIENCE (DOUBLE AWARD)

The question

How do food and oxygen become available for cellular respiration?

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

Equipment

- Student booklet, previous model-gut and breathing records, drawing paper, pencil and ruler
- Biology extension: previous food-calorimetry records and calculator

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

Course coverage: Shared nutrition, digestion and human gas exchange; Biology-only food-energy extension marked.

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. Connect nutrient sources with digestion, absorption and transport using a labelled flow diagram.

2. Explain enzyme substrate/product pairs, including amylase and maltase as separate stages.

3. Compare villus and alveolar adaptations, identifying similarities without claiming identical functions.

4. Distinguish ventilation, gas exchange and cellular respiration.

5. Evaluate evidence from the model gut and breathing investigations, identifying what was actually measured.

6. Biology extension: calculate energy captured by water from your calorimetry data and explain why it differs from a food label.

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

Use actual lesson observations where available. Model-gut glucose was present initially; it was not produced by the membrane. Breathing counts measure frequency, not depth. A food-energy estimate from water heating has substantial losses.

Example / trial	Observation / evidence	Explanation / limit
Evidence / comparison		
Explanation		
Limit / correction		

Show your calculations, labelled model or correction here.

Explain and evaluate

Use evidence and show calculation steps where relevant

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1. What produces glucose from maltose?

2. What does bile emulsify?

3. Give an alveolus–villus similarity.

4. Is breathing the same as respiration?

5. Why is the model gut limited?

6. Biology: what mass is used in water-heating q = mcΔT?