

LESSON PLAN

Photosynthesis and Cellular Respiration

Biology · Year 11 · 60 min

CURRICULUM ALIGNMENT

Aligns to NCEA Level 1 Biology, Achievement Standard 91157 (1.2): Demonstrate understanding of biological ideas relating to the life processes of plants and animals. Internal, 4 credits.

[Te Mātaiaho: Science 1](#)

LEARNING INTENTION

Explain how photosynthesis and cellular respiration are complementary metabolic processes that transform energy and matter in living organisms

SUCCESS CRITERIA

- I can write a balanced word equation for photosynthesis and cellular respiration.
- I can describe where each process occurs within the cell and what conditions are required.
- I can explain how the reactants of one process are the products of the other.
- I can justify why both processes are essential for sustaining life in organisms.
- I can analyse a scenario and identify which process is dominant, using evidence from the data.

Lesson Structure

HOOK

- Two sealed jars: one with a healthy plant, one with germinating seeds.
- Carbon dioxide indicator solution turns yellow in one jar. Which one, and why?
- What do these two jars tell us about what living things are doing right now?

TEACHING

- Photosynthesis: carbon dioxide + water \rightarrow glucose + oxygen (chloroplasts, light required).
- Cellular respiration: glucose + oxygen \rightarrow carbon dioxide + water + ATP (mitochondria, continuous).
- The products of each process are the reactants of the other. This is not coincidence.
- I notice the equations are inverses. I ask: does that mean they cancel out?

PRACTICE

- Given a graph of CO₂ and O₂ levels over 24 hours, identify day and night phases.
- Annotate which process dominates at each time point, with a one-line justification.
- Paired share: one partner argues for photosynthesis, the other for cellular respiration.

CLOSURE

- Which process produces ATP, and where does it occur?
- Name one reactant shared between both processes.
- Exit ticket: one sentence linking the two processes causally.

Task Details

TASK

- Graph showing CO₂ and O₂ levels across 24 hours.
- Write balanced word equations for both processes on the graph.
- Annotate each time point: which process dominates, and why.
- One written sentence linking both processes causally.

MATERIALS

Printed 24-hour CO₂/O₂ graph (one per student), annotation pens or pencils, word equation reference sheet (posted on board, not handed out), exit ticket slip (one per student)

TEACHER ROLE

- Circulate during annotation. Press students to justify claims.
- Target students who conflate the two equations.
- Collect exit ticket slips before students leave.

ASSESSMENT NOTES

- SC1: Balanced word equations are written correctly on the annotated graph.
- SC2: Annotations name chloroplasts or mitochondria and state light dependency.
- SC3: Student identifies shared reactants and products across both equations.
- SC4: Exit ticket sentence links ATP production and gas exchange causally.
- SC5: Time-point justifications cite CO₂ or O₂ data as evidence for dominance.

RESOURCES

 [photosynthesis cellular respiration video](#)

 [photosynthesis cellular respiration activities](#)

RELIEF TEACHER NOTES

- Printed graphs and exit ticket slips are in the teacher's top drawer.
- Word equations are displayed on the board throughout the lesson.
- Students work individually on annotation, then share with a partner.
- Any student unsure of the equations needs one-on-one support at the board.