Photosynthesis and light energy

Student activity • observation and reasoning

YEAR 10 / LESSON 27 / BIOLOGY + SCIENCE (DOUBLE AWARD)

The question

How does light energy enter most food chains?

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: 2.18–2.19. Photosynthesis and equations.

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. Trace light energy from the Sun to photosynthetic organisms, then to organisms feeding on them. Distinguish energy transfer from recycling of matter.

2. Write the photosynthesis word equation and identify carbon dioxide and water as reactants.

3. Balance the symbol equation using $C_6H_{12}O_6$ for glucose. Put light and chlorophyll as conditions associated with the reaction arrow, not as reactant molecules.

4. Build a labelled chloroplast outline with chlorophyll-containing internal membranes. Distinguish this model from structures visible under an ordinary light microscope.

5. Explain uses of glucose in respiration, storage and building biological material. Relate photosynthesis to chemical energy storage.

6. Evaluate the claim “plants obtain all their food from soil”. Explain the different roles of mineral ions, water, carbon dioxide and light.

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

Photosynthesis transfers light energy into chemical energy associated with organic molecules. The standard summary equation is carbon dioxide + water → glucose + oxygen, in the presence of light and chlorophyll. Plants also respire. The equation is a summary of many reactions, not a single collision.

Example / trial	Observation / evidence	Explanation / limit
Energy and matter pathways		
Balanced equation		
Chloroplast model and limits		

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 photosynthesis equation.

2. What is the energy source?

3. What is chlorophyll's role?

4. Why are mineral ions not a substitute for glucose?

5. Give two uses of glucose in a plant.

6. Does photosynthesis mean a plant does not need respiration?