SUBJECT: Biology YEAR: 13 MTP TITLE: Energy transfers HALF TERM: 3-4 NO. OF LESSONS (approx): 22

Deliberate retrieval of expected prior knowledge

- Photosynthesis: Plants convert light energy into chemical energy.
- Respiration: Organisms release energy from food.
- Trophic Levels: Organisms are positioned in food chains as producers and consumers.
- Energy Flow: Energy passes through ecosystems via feeding relationships

Academic transformation

- ATP Production: ATP is produced during both photosynthesis and respiration through proton diffusion down an electrochemical gradient via ATP synthase.
- Efficiency of Energy Transfer: Only about 10% of energy is transferred between trophic levels; the rest is lost as heat, excretion, or undigested material.
- Net Primary Production (NPP): NPP represents the energy available to organisms in higher trophic levels after respiratory losses.
- Decomposers' Role: Bacteria and fungi decompose dead organic matter, recycling nutrients back into the ecosystem.
- Energy Flow Diagrams: Sankey diagrams illustrate energy transfers and losses within ecosystems.

Personal transformation

- Energy Efficiency in Agriculture: Investigate how farming practices can improve energy transfer efficiency.
- Impact of Diet on Energy Transfer: Analyze how different diets affect energy flow in ecosystems.
- Technological Advances: Explore how technology aids in measuring and improving energy transfer in biological systems

Can I Learning Questions

- Can I explain how energy is released during respiration?
- Can I explain how plants convert light energy into chemical energy?
- Can I explain the importance of recycling nutrients?
- Can I calculate the efficiency of energy transferred from one tropic level to the next?

Literacy / <u>Oracy</u>

Key vocabulary

- Photoionisation, NADP, electron transfer chain, protons, catalyse, synthesis, chemiosmotic, photolysis, ribulose bisphosphate, glycerate 3-phosphate, triose phosphate, Calvin cycle, chromatography, dehydrogenase, acetylcoenzyme A, pyruvate, Krebs cycle, oxidative phosphorylation, saprobionts, mycorrhizae, ammonification, nitrification, nitrogen fixation, denitrification, eutrophication

Disciplinary reading

- Biofact sheets
- https://studywise.co.uk/a-level-revision/biology/
- https://www.s-cool.co.uk/a-level/biology
- AQA A Level Biology Revision Notes 2017 | Save My Exams
- https://filestore.aqa.org.uk/resources/biology/specifications/AQA-7401-7402-SP-2015.PDF

Misconceptions

Energy Build-up in Food Chains: Misunderstanding that biomass increases at higher trophic levels.
100% Energy Transfer: Belief that all energy is transferred between trophic levels.
Role of Decomposers: Underestimating the importance of decomposers in nutrient cycling.
Photosynthesis Efficiency: Overestimating the efficiency of photosynthesis in energy capture.
Respiration and Energy Loss: Not recognizing that respiration leads to significant energy loss as heat.
Simplified Energy Models: Over-simplifying energy flow without considering ecological complexities.