Topic 1: Photosynthesis & Respiration

What's the science story?

Photosynthetic life is vital for our survival. It is important we understand the process of photosynthesis, both the reactants and products made. This includes the significance of leaves and how they are adapted to carry out their functions and how plants gain other minerals required for their survival.

This is linked to the understanding of respiration in all living organisms. It is important to understand the difference in aerobic and anaerobic respiration in both plants and animals.

Previous knowledge:

KS2 – Yr 5/6

Living things and habitats

Next steps…

KS4

Yr 10 - B1 Cell Biology

Yr 10 – B2 Organisation

Yr 10 – B4 Bioenergetics

Keywords

Photosynthesis	Water	Biomass	
Glucose	Carbon dioxide	Aerobic respiration	
Adaptations	Starch	Anaerobic respiration	Fermentation
Oxygen	Iodine	Ethanol	

Lesson No. and Title	Learning objectives	National Curriculum	Working scientifically skills	Practical equipment
1. Why are plants producers?	ARE – To identify the reactants and products of photosynthesis. AGD – To explain why life depends on photosynthetic organisms.	• the reactants in, and products of, photosynthesis, and a word summary for photosynthesis • the dependence of almost all life on Earth on the ability of photosynthetic organisms, such as plants and algae, to use sunlight in photosynthesis to build organic molecules that are an essential energy store and to maintain levels of oxygen and carbon dioxide in the atmosphere		
2. Testing for Starch	ARE - To explain how testing for starch is evidence of photosynthesis. AGD - To determine how variegated leaves test for starch.	• plants making carbohydrates in their leaves by photosynthesis		PRAC – Testing a leaf for starch Variegated leaves, ethanol, tweezers, petri dishes, beakers, iodine
3. Adaptations of leaves	ARE - To explain the structure and function of the main components of a leaf. AGD - To determine how gases enter and leave a leaf.	• the adaptations of leaves for photosynthesis • the role of leaf stomata in gas exchange in plants		PRAC – Observing a leaf under the microscope Microscopes and leaves
Assessment 1: Photosynthesis and leaf structure				

4. Plant minerals	ARE-To describe how a plant uses minerals for healthy growth. AGD-To explain the role of nitrates in plant growth.	• Plants gain mineral nutrients and water from the soil via their roots		
5. Aerobic respiration	ARE- To explain the process of aerobic respiration. AGD- To explain the importance of aerobic respiration.	• a word summary for aerobic respiration • aerobic and anaerobic respiration in living organisms, including the breakdown of organic molecules to enable all the other chemical processes necessary for life		PRAC – Investigating energy stores (link combustion to respiration) Rice cakes and quavers, balance, test tubes, beakers, measuring cylinders, thermometers
6. Anaerobic respiration	ARE – To explain the process of anaerobic respiration. AGD- Compare aerobic and anaerobic respiration.	• the differences between aerobic and anaerobic respiration in terms of the reactants, the products formed and the implications for the organism		PRAC – Fatigue Pegs and stopwatch
7. Anaerobic respiration 2	ARE – To describe the difference in anaerobic respiration between animals and other organisms. AGD- To determine the importance of fermentation.	• the process of anaerobic respiration in humans and micro-organisms, including fermentation, and a word summary for anaerobic respiration		PRAC – Respiration in yeast Yeast, sugar, conical flasks, balloons, kettle, thermometer, measuring cylinder.
Assessment 2: Aerobic and anaerobic respiration				

Assessment Criteria

Assessment No. & Title	Working Towards	Age Related Expectations	At Greater Depth
1. Photosynthesis and leaf structure	State the products of photosynthesis.	State the word equation for photosynthesis.	Explain how the structures of the leaf make it well adapted for photosynthesis.
	Name the main structures of the leaf.	Describe the structure and function of the main components of the leaf.	
n/a	Name the minerals required by a plant.	Describe how a plant uses minerals for healthy growth.	Explain deficiency symptoms in plants. Explain how proteins are made for plant growth.
2. Aerobic and anaerobic respiration in organisms	State the requirements and products for aerobic respiration.	Describe the process of respiration.	Explain the uses of the products from anaerobic respiration.
		State the word equation for anaerobic respiration.	
	State one difference between aerobic and anaerobic respiration.	Describe the differences between aerobic and anaerobic respiration.	