Y9 Cycle 1 Science Scholar's Guide

Oxford Spires Academy

Full Name: _____
Tutor Group: _____
Science Class: _____
Science Teacher(s): _____

Science Y9

Cycle 1

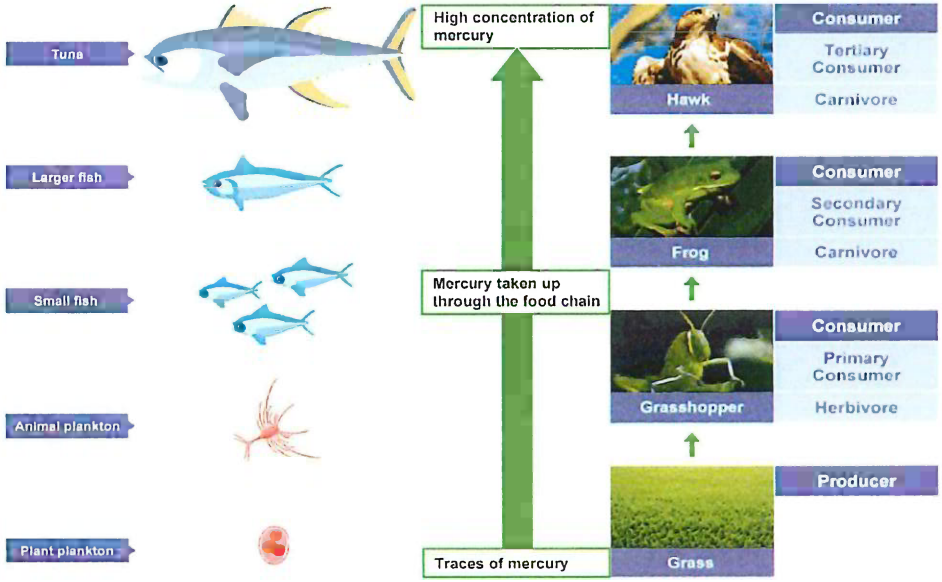
The Knowledge Organisers contain all the knowledge you need to learn.
Below is what you need to be able to do.

	9.1 Ecology, Health and Evolution	9.2 Chemical Reactions
	To revise how to be safe in a Science Lab. Describe how a species' population changes as its predator or prey population changes.	To revise how to be safe in a Science Lab. Describe an oxidation, displacement, or metal acid reaction with a word equation.
	Explain effects of environmental changes and toxic materials on a species' population. Combine food chains to form a food web. Explain issues with human food supplies in terms of insect pollinators	Use particle diagrams to represent oxidation, displacement and metal-acid reactions. Identify an unknown element from its physical and chemical properties.
	Explain and describe the effects of taking different legal and illegal drugs.	Place an unfamiliar metal into the reactivity series based on information about its reactions. Explain why a reaction is an example of combustion or thermal decomposition.
	Mid Point Assessment Re-teach. Use evidence to explain why a species has become extinct or adapted to changing conditions. Evaluate whether evidence for a species changing over time supports natural selection.	**Mid Point Assessment Re-teach.** Predict the products of the combustion or thermal decomposition of a given reactant and show the reaction as a word equation.
	Explain how a lack of biodiversity can affect an ecosystem. Describe how preserving biodiversity can provide useful products and services for humans.	Explain observations about mass in a chemical or physical change. Use particle diagrams to show what happens in a reaction
11&12	Assessment & Reteach	Assessment & Reteach

9.1 Ecology, Health and Evolution KO 1

Know

Organisms in a food web (decomposers, producers and consumers) depend on each other for nutrients. So, a change in one population leads to changes in others. The population of a species is affected by the number of its predators and prey, disease, pollution and competition between individuals for limited resources such as water and nutrients.



Fact

Insects are needed to pollinate food crops.

Key Word	Meaning
Food web	Shows how food chains in an ecosystem are linked.
Food chain	Part of a food web, starting with a producer, ending with a top predator
Ecosystem	The living things in a given area and their non-living environment.
Environment	The surrounding air, water and soil where an organism lives.
Population	Group of the same species living in an area.
Producer	Green plant or algae that makes its own food using sunlight.
Consumer	Animal that eats other animals or plants.
Decomposer	Organism that breaks down dead plant and animal material so nutrients can be recycled back to the soil or water.
Bioaccumulation	Build-up of toxins up a food chain

9.1 Ecology, Health and Evolution KO 2

Know
Drugs are chemicals that can alter the normal functioning of the body.

Fact
Health is the state of physical and mental well-being.

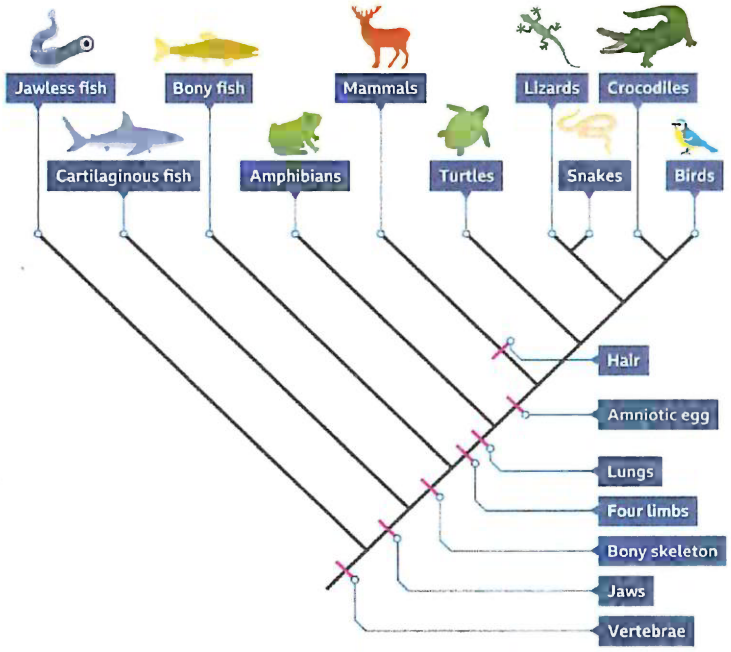
Key Word	Meaning
Painkillers	Relieve pain (eg paracetamol, morphine and codeine)
Stimulants	**Speed up** body systems (eg caffeine, cocaine, ecstasy, amphetamines)
Depressants	**Slow down** body systems (eg alcohol, cannabis, tranquillisers, heroin)
Hallucinogens	Cause users to sense things that do not exist (eg LSD, magic mushrooms)
Recreational drug	**Not** used for medical reasons
Class A drug	Most harmful types of drugs
Addiction	Craving a drug, even if it's harmful
Withdrawal	Coming off drugs in controlled steps

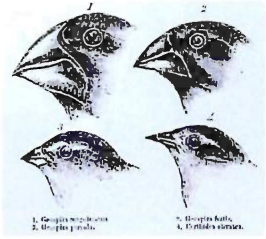
9.1 Ecology, Health and Evolution KO 3

Know

Natural selection is a theory that explains how species evolve and why extinction occurs.

Biodiversity is vital to maintaining populations. Within a species variation helps against environment changes, avoiding extinction. Within an ecosystem, having many different species ensures resources are available for other populations, like humans.





Darwin's Finches

Key Word	Meaning
Population	Group of organisms of the same kind living in the same place.
Natural selection	Process by which species change over time in response to environmental changes and competition for resources.
Extinct	When no more individuals of a species remain.
Biodiversity	The variety of living things. It is measured as the differences between individuals of the same species, or the number of different species in an ecosystem.
Competition	When two or more living things struggle against each other to get the same resource.
Evolution	Theory that the animal and plant species living today descended from species that existed in the past.

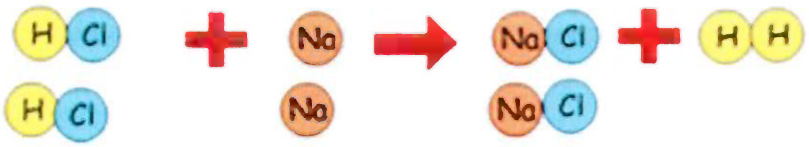
9.2 Chemical Reactions KO 1

Know
Name the products of the reactions of acids and metals, acids and metal carbonates and acids and bases.

Diagram:

Particle picture:

Hydrochloric acid + sodium → sodium chloride + hydrogen gas



Fact
Bases neutralise acids, an example of a soluble base is an alkali e.g. sodium hydroxide, and example of a soluble base is an metal oxide e.g. copper oxide

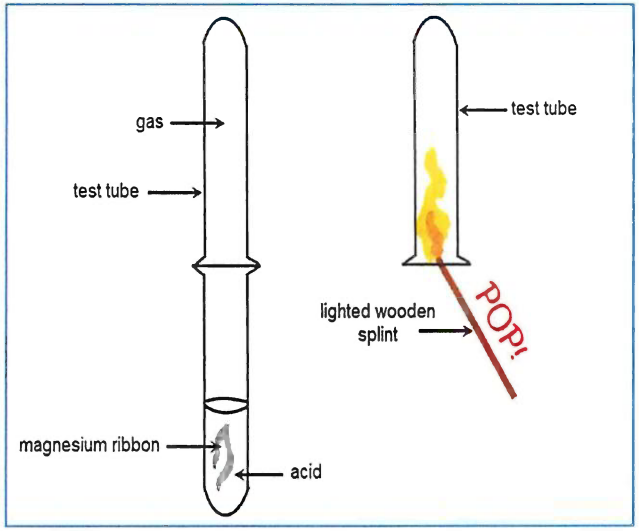
Key Word	Meaning
Reactants	Substances that react together, shown before the arrow in an equation.
Products	Substances formed in a chemical reaction, shown after the reaction arrow in an equation.
Base	A substance that neutralises an acid – those that dissolve in water are called alkalis.
Neutralisation	Mixing an acid and base until neutral (pH=7), forming a metal salt and water.

Key equations	Important info
Acid + metal → metal salt + hydrogen	Metal salts are not usually made using this method as hydrogen is highly flammable
Acid + metal carbonate → Metal salt + carbon dioxide + water	This reaction always produces carbon dioxide so you will see fizzing/bubbling
Neutralisation **Acid + alkali → metal salt + water** **Acid + metal oxide → metal salt + water**	**An alkali is a soluble base, e.g. sodium hydroxide** **A metal oxide is an insoluble base and is usually a solid.**

9.2 Chemical Reactions KO 2

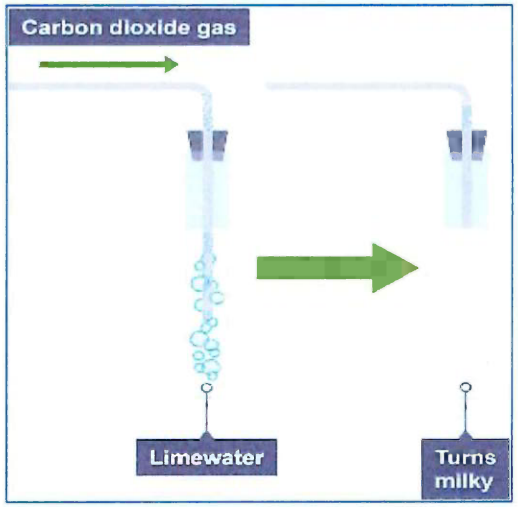
Know
Describe the test and results for hydrogen gas, carbon dioxide gas and oxygen gas

Diagram: Testing for gases:



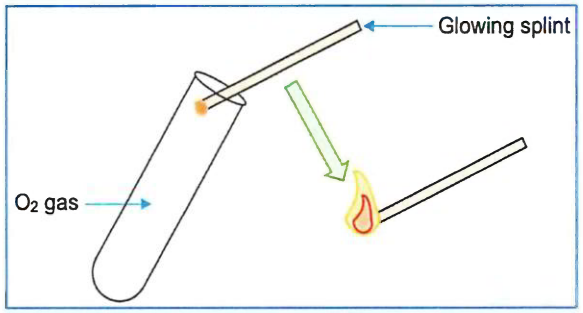
Hydrogen gas (H_2)

Test : Put a burning splint in the gas.
Result: Burns with a squeaky pop.



Carbon dioxide gas (CO_2)

Test : Bubble the gas through limewater.
Result: Limewater turns cloudy.



Oxygen gas (O_2)
Test: Put a glowing splint in to the gas.
Result: Glowing splint
Relights.

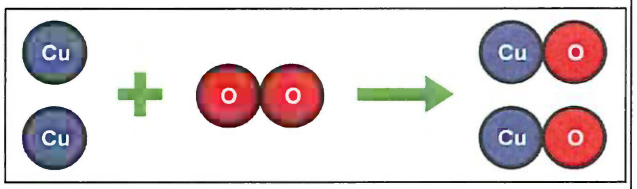
9.2 Chemical Reactions KO3

Know

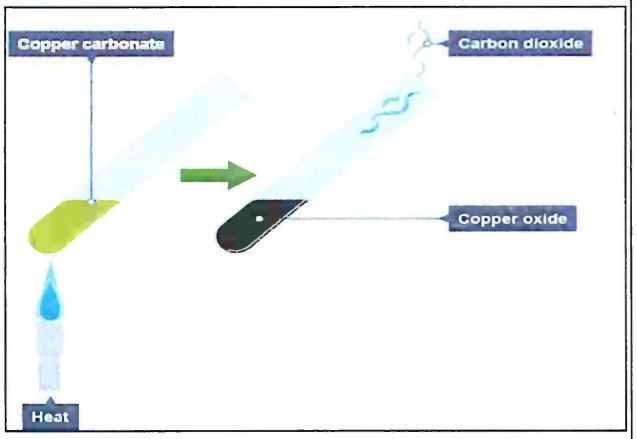
Combustion is a reaction with oxygen in which energy is transferred to the surroundings as heat and light. Thermal decomposition is a reaction where a single reactant is broken down into simpler products by heating.

Diagram:

Oxidation:



Thermal Decomposition:



Fact

Law of conservation of mass states that the total mass of the reactants is the same as the total mass of the products.

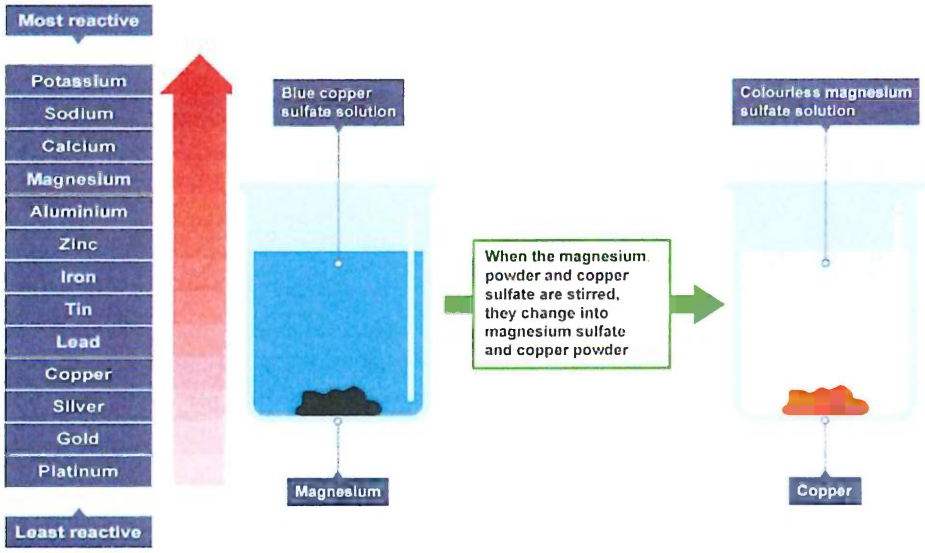
Key Word	Meaning
Conserve	When the quantity of something does not change after a process takes place.
Oxidation	Reaction in which a substance combines with oxygen.
Thermal decomposition	Reaction where a single reactant is broken down into simpler products by heating.
Catalyst	Substances that speed up chemical reactions but are unchanged at the end.

Key equations	Important info
Oxidation example: **Copper + oxygen gas → copper oxide**	Most metals react with with oxygen in the air to form a metal oxide, the mass will appear to increase as the metal bonds with the oxygen from the air.
Thermal decomposition example: **Copper carbonate →** **copper oxide + carbon dioxide**	Heating a metal carbonate will produce a metal oxide and carbon dioxide gas, the mass will appear to decrease as the carbon dioxide escapes into the air.

9.2 Chemical Reactions KO 4

Know
Metals can be arranged as a reactivity series in order of how readily they react with other substances.

Diagram



Fact
A more reactive metal will displace a less reactive metal from a compound.

Key Word	Meaning
Displacement	Reaction where a more reactive metal takes the place of a less reactive metal in a compound.
Reactivity	The tendency of a substance to undergo a chemical reaction.
Catalysts	Substances that speed up chemical reactions but are unchanged at the end.
Exothermic reaction	One in which energy is given out, usually as heat or light.
Endothermic reaction	One in which energy is taken in, usually as heat.
Chemical bond	Force that holds atoms together in molecules.
Mineral	Naturally occurring metal or metal compound
Ore	Naturally occurring rock containing sufficient minerals for extraction.
Electrolysis	Using electricity to split up a compound into its elements