

Science Knowledge Organiser – B3 Life on Earth

B3.1 Systems in balance – how do different species depend on each other?	
Species	A group of similar individuals that can breed together and produce fertile offspring.
Adaptation	A feature that helps an organism to survive in its environment.
Competition	Different organisms requiring the same resource e.g. water, food, shelter or space.
Interdependence	Relationships between different living things that they rely on to survive.
Food web	Series of linked food chains showing the feeding relationships in a habitat.
Extinct	When all members of a species have died out.
Carbon cycle	Cycling of Carbon through the environment between the atmosphere, biosphere, hydrosphere and lithosphere.
Combustion	The chemical term for burning (in oxygen).
Respiration	A series of chemical reactions in cells that release energy for cells to use.
Photosynthesis	A chemical reaction in green plants using energy in sunlight to convert water and carbon dioxide into glucose and oxygen.
Decomposition	The process of breaking down dead plants and animals and waste by microorganisms.
Detritivore	An organism feeding on dead organisms and waste.
Nitrogen cycle	Describes how nitrogen moves between living things, the atmosphere and the soil.
Nitrogen fixation	Making nitrogen compounds from nitrogen gas in the air.
Nitrogen fixing bacteria	Bacteria found in the soil and the root nodules of some plants (legumes) that convert nitrogen gas into nitrogen compounds.
Denitrification	Conversion of nitrogen in the soil into nitrogen in the air by bacteria.
Percentage efficiency	Energy transferred to the next level ÷ total energy in x 100
Reasons for extinction	<ul style="list-style-type: none"> • rapid changes to the environment, such as the climate • new diseases • new predators • new competitors
Energy losses from the food chain	<ul style="list-style-type: none"> • used as heat energy • used for life processes • faeces and remains are passed to decomposers
Role of microorganisms in the carbon cycle	They break down the remains of dead plants and animals and, in doing so, release carbon dioxide through respiration.
Role of microorganisms in the nitrogen cycle	<p>Nitrogen fixing bacteria convert nitrogen in the air into nitrogen compounds in the soil.</p> <p>Nitrogen compounds in living things are returned to the soil when decomposers breakdown dead plants and animals.</p> <p>Denitrifying bacteria convert nitrogen compounds in the soil into nitrogen in the air.</p>
Living indicators	The presence or absence of certain living organisms acts as an indicator of the amount of pollution.
Examples of living indicators	Clean water: mayfly larvae and freshwater shrimp Air: lichens
Non-living indicators	A way of measuring environmental change using factors such as temperature, carbon dioxide levels and nitrate levels.

B3.2 How has life on Earth evolved?

Variation	Differences between individuals. Can be caused by genes, the environment or a combination of both.
Mutation	A change in the DNA of an organism.
Evolution	The process by which a species gradually changes over time.
Natural selection	The process by which evolution occurs.
Steps in natural selection	Individuals show variation due to differences in their genes. Individuals that are best suited to their environment are more likely to survive and reproduce, passing on their features to their offspring.
Selective breeding	Choosing parent organisms with certain characteristics and mating them to try and produce offspring that have those characteristics.
Fossil	The remains of dead plants and animals preserved in rocks.
Evidence for evolution	1. similarities and differences between fossils and living things 2. similarities and differences in the DNA of living things
Comparing evolution and natural selection	Both can cause changes in animals or plants. Natural selection occurs in nature but selective breeding requires human intervention.
How new species evolve	The combined effect of mutations, environmental changes, natural selection and isolation can produce new species in the process of evolution.

B3.2 How has life on Earth evolved? Contribution of scientists

Darwin	Natural selection. Organisms with useful features are more likely to survive and reproduce and pass on these features. Darwin's idea accounted for the observations of life on Earth (i.e. why we still have simple organisms) and made links between variation and competition.
Lamarck	Acquired characteristics. Animals change during their lifetimes and pass these changes to their offspring. Example: a giraffe stretches to reach food so its neck gets longer – this longer neck is passed on to offspring. This theory doesn't have a genetic basis and cannot account for all observations of life on Earth.

B3.3 What is the importance of biodiversity?

Classification	Putting living things into groups based on shared characteristics.
Biodiversity	The variety of species on Earth and the genetic variation within them.
Sustainability	Using resources and the environment to meet the needs of people today without damaging the Earth or reducing resources for future generations.
Monoculture	Continuous growing of one type of crop that is often genetically identical.
Importance of biodiversity	Important for the future development of food crops and medicines.
Extinction due to humans - direct	Through activities such as hunting.
Extinction due to humans - indirect	Through activities such as removing habitat or introducing a new species into a habitat.
Improving sustainability	Maintaining biodiversity. Using biodegradable packaging and recycling packaging.