Orchard Key Science Concepts

At Orchard Primary School, children learn Science through a concept-based curriculum. Not only does this allow them to gain a deeper understanding beyond solely the topic facts, but concepts or 'big ideas' also allow pupils to make connections between their learning, enabling them to make sense of the facts and the world around them.

As part of our Science curriculum, we involve the use of specific key questions which focus upon factual, conceptual and debatable content. Concepts are returned to throughout the year groups to ensure children have a clear understanding of them, thereby enabling them to be held within their long-term memory.

Please find below are a list of concepts that the children at Orchard Primary School focus upon in Science and our reasoning behind their choice.

Concept	Why learn about this concept?	Year group studied (though may be referred to within other year groups).
Similarity and difference	Scientists recognise that some things are the same, while others are different. This concept is referred to as similarity and difference. A similarity is a sameness or alikeness. When you are comparing two things — physical objects, natural phenomena — you often look at their similarities and their differences. Difference is the opposite of similarity. In order for our children to understand the wide world around them with all of its diversity and variety we need them to be able to understand this very important concept.	1-6
Cause and Effect	Cause and effect is a relationship between events or things, where one is the result of the other or others. This is a combination of action and reaction. Scientists study causes all the time. There are many events that take place in the world with causes that generate observable patterns. So, if the cause is the 'why' then the effect is the 'what.' The effect is an event that happens because of a cause. If you have ever asked yourself a question that starts with, 'What will happen if I…', then you are questioning the effects of your actions. We encourage our children to ask Big Questions and to investigate Cause and Effect.	1-6
Adaptation	Every animal or plant on Earth has adaptations, or specific characteristics that help it stay alive in its habitat. Examples of adaptations are fur, feather and fat (to help animals keep warm in cold habitats), long legs (to help animals escape from their predators) or camouflage (to help animals hide from their predators). We encourage our children to know the importance of adaptation because it is essential for the survival of living organisms. As the environment changes, the animals that cannot adapt die out. Our planet at the moment is undergoing worrying changes due to climate change as the Earth has warmed by 1 degrees. As temperatures rise, some areas will get wetter and lots of animals (and humans!) could find they're not able to adapt to	2-6

	their changing climate. This could result in extinction for many types of animals or plants which our children will inherit, therefore it is a very important concept to understand.	
Function	A function is the special purpose or use of something. We encourage our children to research each function alongside our BIG questions to ensure understanding is embedded which will in turn encourage more investigation and research.	2-6
Growth	Growth refers to the gradual increase (e.g. in size or number) of an animal or vegetable body over time or the development of an organism, e.g. of a plant from a seed to full maturity. It is important for our children to understand how good growth and development are crucial to remaining healthy in themselves and in other organisms that live on our planet as this allows them to survive and reproduce successfully.	1-6
Changes	A change is when something becomes different from its original form. There are many times when it is important for children to understand how changes occur and why in Science. I.e. Irreversible changes where new materials are always formed through heat, burning or mixing substances. Reversible changes might change how a material looks or feels, but it doesn't create new materials. Examples of reversible reactions include dissolving, evaporation, melting and freezing.	1-6
Working Scientifically	Our pupils should have the opportunity of Working Scientifically and carrying out practical investigations in science that help them to develop their scientific skills by asking questions, making predictions, setting up tests, observing and measuring, recording data, interpreting and communicating results and evaluating. To enable them to carry out these our children will use 5 types of scientific enquiry: observing over time; pattern seeking; identifying, classifying and grouping; comparative and fair testing (controlled investigations); and researching using secondary sources. These have been developed into symbols that the children have designed so that they can independently understand what kind of enquiry they are using and the method they will use to complete their work.	1-6
Processes	A process is a number of actions for making or doing something. A process is not just useful in science, but in any situation that requires critical thinking. Science process skills include observing qualities, measuring quantities, sorting/classifying, inferring, predicting, experimenting, and communicating. Our children need to understand that the scientific method encourages the use of logic and reasoning together with evidence to minimize the influence of bias or prejudice. It provides an objective, standardized approach to conducting experiments and, in doing so, improves their results.	2-6

Structure	A structure is anything made up of parts held together in a particular way. Plants and animals have many different structures that help them survive. Each structure has a function that is special to that organism and ensures that it will survive. Some structures are internal, like the lungs, brain, or heart. Other structures are external, like skin, eyes, and claws. Some structures are unique, like the long neck of a giraffe. Other structures are more common, like a heart. It is important that our children become familiar with the structures of different animals in KS1 as they begin to understand basic structure of plants or animals. In KS2 they then relate the functions of these structures to each organism as they link what they know and learning becomes more in depth.	1-6
Evolution	The process by which living things can gradually change over time is called evolution. Evolution is where everything in the natural world is in competition for survival and the winners are those that have characteristics which make them better adapted to survive. For example, they are stronger, faster than others in their species. These living things are more likely to reproduce and pass on their useful characteristics to their offspring. This means that over time, the characteristics that help survival become more common and a species gradually changes. Given enough time, these small changes can add up to the extent that a new species altogether can evolve. It is important that our children understand that animals can't adapt to new conditions in their lifetimes and pass these adaptations on to their offspring, they have no control over how they adapt to survive as it takes many, many years to evolve. Understanding evolution is important because it helps us solve biological problems that impact our lives. There are excellent examples of this in the field of medicine. To stay one step ahead of certain diseases, researchers must understand the evolutionary patterns of disease-causing organisms.	Y5-Y6
Variation	The presence of differences between living things of the same species is called variation. Variation between different species is usually greater than the variation within a species. Some variation is passed on from parents to offspring, via genes, during reproduction. This is inherited variation. Some variation is the result of differences in the surroundings, or what an individual does. This is called environmental variation. It is important for our children to understand what this is as variation helps a species to survive, by causing individuals of a species to be genetically and physically different. If all the individuals of a species were genetically identical they would be vulnerable to the same diseases. If this were the case a single disease could wipe out an entire species.	Y5-Y6