Science at Great Whelnetham C of E Primary School

Year 6

Working Scientifically
Across both the school years, children will experience a range of purposeful, practical opportunities to raise questions and recognise they can be answered in different ways. This will include: • Planning different types of scientific enquiries to answer questions • Recognise and control variables within an enquiry • Taking measurements, using a range of scientific equipment • Recording data and results using scientific diagrams and labels, classification keys, tables, scatter graphs and bar and line graphs • Using test results to make predictions and set up further comparative and fair tests • Reporting and presenting findings from enquiries in oral and written forms such as displays and other presentations • Identifying scientific evidence that has been used to support or refute ideas or arguments

Title	**Autumn 1: Light**
Overview	During this unit, the children will explore the way that light behaves. They will explore light sources, reflections and shadows and will be able to talk about what they notice. They will be able to explain how light travels and why this allows us to see objects. They will draw scientific diagrams to show this. They will also explore how shadows are cast.
Knowledge Acquisition	The children will know various sources of light and the difference between primary and secondary sources, understanding how secondary sources are reflecting light from primary sources. They will know that light travels in straight lines and that this is what causes shadows of the same shape as a object. They will understand how light reflects off objects into our eyes and that this is how we see them. They will have a basic knowledge of the angle at which light will reflect off a flat surface.
Key Vocabulary	Light, straight lines, shadow, reflection, source, opaque, transparent, mirror, eye, primary source, secondary source
Key LOs	➢ Recognise that light appears to travel in straight lines ➢ Use the idea that light travels in straight lines to explain that objects are seen because they give out or reflect light into the eye ➢ Explain that we see things because light travels from light sources to our eyes or from light sources to objects and then to our eyes

	➢ Use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them
Key learning experiences	➢ Make predictions about how light travels and how we see objects, linking this to real life practical scenarios ➢ Draw scientific diagrams to show how light travels and casts shadows of different sizes ➢ Set up an investigation to explore the relationship between light sources, objects and shadows ➢ Make and experiment with, a periscope

Title	Autumn 2: Materials and Changes of State
Overview	Children will use a range of practical resources to compare and group together everyday materials on the basis of their properties, including their hardness, solubility, transparency, conductivity (electrical and thermal), and response to magnets. They will then explore the uses of these materials. Children will use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating. We will then aim to prove that we can change some states of matter and then reverse them. Through observations we will investigate how some materials change state when heated or cooled and explain the science behind this, also understanding that in an irreversible change, a new substance is always created.
Knowledge Acquisition	The children will understand different materials and how they vary from one another, as well as how this affects their uses and applications. They will revisit the 3 states of matter and how we can change some materials between the states. They will know that some changes are reversible and some are not, using demonstrations and examples of each, and that when they are not, a new substance is often created. They will learn ways to separate materials that have been mixed, using sieves, filters and heat to observe this separation. They will understand how a solid can dissolve in a liquid, that the liquid has a different saturation point for different solids, and that heat can affect the speed at which it dissolves.
Key Vocabulary	Materials, change of state, solid, liquid, gas, evaporation, condensation, melting, filter, sieve, reversible, irreversible, mixing, temperature, saturation, hardness, solubility, transparency, conductivity
Key LOs	➢ Compare and group together everyday materials on the basis of their properties, including their hardness, solubility, transparency, conductivity (electrical and thermal), and response to magnets. ➢ Know that some materials will dissolve in liquid to form a solution, describe how to recover a substance from a solution, and understand that a liquid will reach a point of saturation. ➢ Investigate what factors might affect the speed that substances dissolve in a liquid ➢ Explain that some changes result in the formation of new materials, and that this kind of change is not usually reversible, including changes associated with burning and the action of acid on bicarbonate of soda.

	➢ Use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating. ➢ Demonstrate that dissolving, mixing and changes of state are reversible changes. ➢ Compare and group materials together, according to whether they are solids, liquids or gases. ➢ Observe that some materials change state when they are heated or cooled, and measure or research the temperature at which this happens in degrees Celsius (°C).
Key Learning Experiences	➢ Identify characteristics of different objects using the correct scientific vocabulary. ➢ Investigate how materials dissolve in water. Suggest ways to recover them from water. ➢ Identify the properties of solids, liquids and gases. ➢ Investigate reversible and irreversible changes, speed of dissolving and saturation points for different solids in the same liquid

Title	**Spring 1: Electricity**
Overview	In this unit, the children will have the opportunity to construct their own simple series circuits. They will use these to answer questions about what happens when they try different components. They will go on to learn how to accurately represent their circuit using recognised symbols.
Knowledge Acquisition	The children will know what uses we have for electricity, and consider ways to reduce our usage. By learning about ways that our electricity is generated by either renewable or non-renewable methods, children will then understand the importance of saving electricity where possible. They will know how electrons flow from a positive to negative part of a cell or battery, and that a circuit must be created to allow this flow to take place. They will then build circuits using cells and various components, learning how the size of the cell and the quality of the connections in the circuit affect how well things work. They will also use these simple circuits to investigate the conductivity of different materials. They will know how to represent these circuits in a diagram and understand the importance of clear and accurate drawing using recognised symbols. A Homework project will run alongside the unit, where the children research deeper into either the history of the science of electricity or the use of renewable energies.
Key Vocabulary	Electrons, electricity, circuit, cell, power, energy, renewable, solar, wind, wave, fossil fuels, non-renewable, switch, diagram, bulb, wire, buzzer
Key LOs	➢ Associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit ➢ Compare and give reasons for variations in how components function, including the brightness of bulbs, the loudness of buzzers and the on/off position of switches ➢ Use recognised symbols when representing a simple circuit in a diagram

Key Learning Experiences	➢ Build simple circuits, including components such as switches, bulbs, buzzers and motors ➢ Create a human model for an electrical circuit ➢ Use the correct scientific symbols to represent their circuit ➢ Create a presentation as part of a Homework project about famous scientists who worked with electricity or the use of renewable energies

Title	**Spring 2: Evolution and Inheritance**
Overview	This unit will aim to help children to recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago. Through study of wildlife in various habitats we will understand that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents. This unit will introduce the Science through the work and voyage of Charles Darwin to the Galapagos on the HMS Beagle. Children will identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution.
Knowledge Acquisition	Children will learn who Charles Darwin was, his early life and how he came to be the naturalist on the HMS Beagle. Through this they will then follow Darwin's voyage of discovery as he realised how animals become adapted to their environment by natural selection, how this happens by accident through natural variations in generations of a species, and that it is driven by the need to survive. They will find out how certain animals are adapted to their specific environments, and consider how some species have actually become over-adapted. They will know about selective breeding and over-breeding by human design in both animals and plants. They will understand how fossils provide us with some of the evidence for evolution as a window to the past.
Key Vocabulary	Adaptation, evolution, inheritance, characteristics, Charles Darwin, HMS Beagle, habitat, environment, survival of the fittest, offspring, fossils, evidence, observations
Key LOs	➢ Identify the adaptations that have taken place in certain familiar animals and how they help those animals to survive ➢ Know key observations made by Darwin and how these led him to form his famous theory ➢ Identify common characteristics in their own family and how there are both shared features and variation across the generations ➢ Understand how adaptation and variation over time can lead to evolution ➢ Recognise the influence of habitat on adaptation ➢ Describe how certain animals have adapted to their environment.
Key Learning Experiences	➢ Recognise that living things produce off spring of the same kind, but normally offspring vary and are not identical to their parents. ➢ Create a new dog breed by considering how cross breeding works ➢ Visit the Museum of Zoology in Cambridge for a workshop led by an expert, looking at artefacts from Darwin's voyage and studies (if possible) ➢ Conduct a family survey to identify inherited characteristics and natural variations – comparing these to acquired traits. ➢ Look at fossils to understand how they provide evidence of life from millions of years ago

Title	Summer 1:Living Things – Habitats, Classification and Life Cycles
Overview	During this half term, the children will ask questions about the animals they may see in their local environment, discussing and deciding how to classify them and what models we can use to do so. They will study the life cycle of these animals and make comparisons between the life cycles of different types of animal. They will also build on prior knowledge about the pollination of plants, to explain the process of reproduction in some plants. Finally, they will study the life and work of David Attenborough.
Knowledge Acquisition	The children will know that there are key characteristics in plants and animals which help us to sort them into different categories and species. They will use that knowledge and apply it to animals in the local area, becoming more familiar with the classification methods. They will understand how the different types of animal have different life cycles and that some types of animal have extra stages, such as metamorphosis in insects and amphibians. The children will look at live plants to learn about the parts, life process and reproduction in those plants. They will then focus on the famous naturalist David Attenborough and learn through research about his achievements, opinions and work.
Key Vocabulary	Life cycle, mammal, amphibian, insect, bird, reproduction, naturalist, environment, metamorphosis, larvae, eggs, live young, vertebrates, invertebrates
Key LOs	➢ Understand classification models and use them to sort different creatures according to their characteristics ➢ Identify wildlife in the local environment and use classification models to decide where they belong ➢ Describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird ➢ Describe the life process of reproduction in some plants and animals ➢ Research key facts and details about a person and give an overview of their life
Key Learning Experiences	➢ Identify the different stages within a life cycle of a mammal, amphibian, insect and bird. Within this, identify how they reproduce (eggs/live offspring) ➢ Compare animals found in our local environment and their life cycle, to the life cycle of an animal found in a different environment. ➢ Identify the differences between the different life cycles, but how they all do change over time ➢ Pupils to create their own classification keys ➢ Explain the process of reproduction in some plants – chn to act out the process ➢ Research the work of a naturalist (David Attenborough) and make connections with their learning from this half term

Title	Summer 2: Animals including Humans
Overview	During this topic, we will find out about the life cycle of a humans and the changes that happen between each stage, discussing both physical and behavioural changes. They will compare pictures of humans at each stage in order to identify the changes that have happened. The children will have the opportunity to use their computing skills in order to research the gestation periods of some different animals and compare this to humans. They will also complete a research project about the life expectancy of humans in some different countries and think about the reasons for these differences. This unit will be taught alongside our Sex and Relationships unit in PSHE, where the children will recap changes during puberty and then move on to sex, relationships and child birth.
Knowledge Acquisition	The children will learn that humans are mammals and so our life cycle is similar to that of other mammals, including features such as giving birth to live young and feeding young with mother's milk. They will look in depth at each stage and decide what physical and behavioural changes take place as we humans grow up and age. They will understand how the human gestation period compares to that of other mammals. They will also gain knowledge about life expectancies in different cultures or parts of the world and form hypotheses for the reasons for that. The children will learn/recap the changes that take place during puberty for both boys and girls and how growing up will affect their life from both a physical and emotional point of view. This will then be developed through discussions to include friendships and loving physical relationships, leading towards a sexual relationship between consenting partners.
Key Vocabulary	Life cycle, reproduction, puberty, sex, hormones, physical changes, behavioural changes, gestation, birth, infant, child, teenager, adult, old age
Key LOs	➢ Recognise the stages of a mammal's lifecycle and understand how we follow the same cycle ➢ Research the human circulatory system and report their findings. Focus on blood vessels, blood and the heart. ➢ Describe how water and nutrients are transported around the body. ➢ Describe the physical changes as humans develop to old age ➢ Describe the behavioural changes as humans develop to old age ➢ Recognise differences in gestation periods between species of mammal ➢ Suggest reasons for differences in life expectancy across regions and cultures ➢ Know the changes that take place during puberty and how these are different for girls and boys
Key Learning Experiences	➢ Identify the different stages within a life cycle of a human ➢ Create human model to show how blood is pumped around the body. ➢ Show images of human organs that have been affected by poor lifestyle choices and discuss the impact diet can have on the body. ➢ Describe the changes between each stage, including learning about the changes that happen during puberty

	➢ Compare pictures of young children, young adults and elderly people and describe the differences ➢ Research the gestation periods of other animals and compare them to humans. ➢ Research the life expectancy of some different countries and report on reasons for this ➢ Have the opportunity for an all-female or all-male discussion about changes during puberty and sex and relationships