**Science Curriculum Rationale for Holmes Chapel Primary School**

At Holmes Chapel Primary School, we aim for the children to develop a love of science and a strong understanding of the world around them whilst developing scientific enquiry skills and scientific knowledge. Throughout their time at school; the children will acquire and develop the key knowledge that has been identified within each unit and apply scientific enquiry skills. Topics are revisited and developed, enabling the children to build upon their prior knowledge and gain an understanding of scientific knowledge and conceptual understanding.

**Intent**

The national curriculum for science 2014 aims to ensure that all pupils:

* develop scientific knowledge and conceptual understanding through the specific disciplines of biology, chemistry and physics
* develop understanding of the nature, processes and methods of science through different types of science enquiries that help them to answer scientific questions about the world around them
* are equipped with the scientific knowledge required to understand the uses and implications of science, today and for the future.

At Holmes Chapel Primary School the intent of our science curriculum is to:

* be inclusive and accessible to all
* show how science is relevant to the real world
* have a spiral approach where key ideas are revised and further developed as the children move through school
* have an enquiry approach through: observing over time, classifying and grouping, comparing and fair testing, pattern seeking and researching using secondary resources
* develop the skills of observation, prediction, problem solving, decision making, communication and critical thinking
* be practical
* to show how science is cross-curricular
* ask questions to investigate
* use scientific equipment accurately

**Implementation/Design (Key Concepts)**

Our curriculum follows the ‘The National Curriculum programmes of study for Science’ and ‘Understanding the World’ in the Early Years Foundation Stage. It is led and overseen by the science lead. A cycle of lessons for each unit is carefully planned for, building on prior learning, to develop key knowledge, scientific thinking, enquiry skills, vocabulary, reasoning and resilience. Teachers create a positive attitude to Science learning within their classrooms and use out of class learning opportunities, for example within the school grounds or field trips, where possible to enhance learning opportunities.

**EYFS Science Curriculum**

The children are given opportunities to comment on and ask questions about their familiar world and the natural world; they are encouraged to look closely at similarities, differences, patterns and changes, make observations of plants and animals, explain why some things occur and talk about the plants, animals and natural objects they have found. They develop an understanding of growth, decay and changes over time and show care and concern for living things and the environment. The children are encouraged to talk about the features of their own immediate environment and about how environments may vary from one another.

**Years 1 – 6 Science Curriculum**

The children will be taught the following working scientifically skills through the units of scientific knowledge.

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| **Working Scientifically in Key Stage 1*** ask simple questions and recognising that they can be answered in different ways
* observe closely, using simple equipment
* perform simple tests
* identify and classify
* use their observations and ideas to suggest answers to questions
* gather and record data to help in answering questions.
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| **Year 1**: | * Animals, including Humans
* Plants
* Everyday materials
* Seasonal Changes
 | **Year 2:** | * Animals, including Humans
* Plants
* Living things and their habitats
* Uses of everyday materials
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| **Working Scientifically in Lower Key Stage 2*** ask relevant questions and using different types of scientific enquiries to answer them
* set up simple practical enquiries, comparative and fair tests
* make systematic and careful observations and, where appropriate, take accurate measurements using standard units, use a range of equipment, including thermometers and data loggers
* gather, record, classify and present data in a variety of ways to help in answering questions
* record findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables
* report on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions
* use results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions
* identify differences, similarities or changes related to simple scientific ideas and processes
* use straightforward scientific evidence to answer questions or to support their findings.
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| **Year 3:** | * Animals, including Humans
* Plants
* Rocks
* Light
* Forces & magnets
 | **Year 4:** | * Animals, including Humans
* Living things and their habitats
* States of matter
* Electricity
* Sound
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| **Working Scientifically in Upper Key Stage 2:*** plan different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary
* take measurements, using a range of scientific equipment, with increasing accuracy and precision, take repeat readings when appropriate
* record data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs
* use test results to make predictions to set up further comparative and fair tests
* report and present findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations
* identify scientific evidence that has been used to support or refute ideas or arguments
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| **Year 5:** | * Animals, including Humans
* Living things and habitats
* Earth and Space
* Forces
* Properties and changes of materials
 | **Year 6:** | * Animals, including Humans
* Evolution and inheritance
* Living things and their habitats
* Electricity
* Light
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See Appexdix 1 for the full list of objectives for each unit.

**Impact**

This successful approach at Holmes Chapel Primary School results in a fun, engaging, high quality science education that provides the children with the foundations, knowledge and skills for understanding the world. We expect the children to make good progress across the science curriculum; retain key knowledge and work scientifically, have a rich scientific vocabulary which will enable them to articulate their scientific knowledge and have high aspirations to see them through further scientific study.

**Assessment**

Informal assessment is carried out by the teacher throughout each lesson, making judgements based on progress against the lesson objective. Specific assessment tasks will be planned linked to the Science End Points. An overall Science assessment is made at the end of each academic year using assessments gained throughout the year; working towards the end of year expectations, have met the end of year expectations or are working at greater depth, and this information is shared with the next teacher and the Science Subject Leader.

**Appendix**

1. NC Science Programme of Study Objectives

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|  | Year 1 | Year 2 |
| Biology | **Plants*** identify and name a variety of common wild and garden plants, including deciduous and evergreen trees
* identify and describe the basic structure of a variety of common flowering plants, including trees.

**Animals*** identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals identify and name a variety of common animals that are carnivores, herbivores and omnivores
* describe and compare the structure of a variety of common animals (fish, amphibians, reptiles, birds and mammals, including pets)
* identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense.
 | **Living things & habitats*** Explore and compare the differences between things that are living, dead, and things that have never been alive
* identify that most living things live in habitats to which they are suited and describe how different habitats provide for the basic needs of different kinds of animals and plants, and how they depend on each other
* Identify and name a variety of plants and animals in their habitats, including microhabitats
* Describe how animals obtain their food from plants and other animals, using the idea of a simple food chain, and identify and name different sources of food.

**Plants*** observe and describe how seeds and bulbs grow into mature plants
* find out and describe how plants need water, light and a suitable temperature to grow and stay healthy.

**Animals, including humans*** notice that animals, including humans, have offspring which grow into adults
* find out about and describe the basic needs of animals, including humans, for survival (water, food and air)
* describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene.
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| Chemistry | **Materials*** distinguish between an object and the material from which it is made
* identify and name a variety of everyday materials, including wood, plastic, glass, metal, water, and rock
* describe the simple physical properties of a variety of everyday materials
* Compare and group together a variety of everyday materials on the basis of their simple physical properties.
 | **Materials*** identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses
* find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching.
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| Physics | **Seasonal Changes*** observe changes across the four seasons
* observe and describe weather associated with the seasons and how day length varies.
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|  | Year 3 | Year 4 |
| **Biology** | **Plants*** identify and describe the functions of different parts of flowering plants: roots, stem/trunk, leaves and flowers explore the requirements of plants for life and growth (air, light, water, nutrients from soil, and room to grow) and how they vary from plant to plant
* investigate the way in which water is transported within plants
* explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal.

**Animals*** identify that animals, including humans, need the right types and amount of nutrition, and that they cannot make their own food; they get nutrition from what they eat
* identify that humans and some other animals have skeletons and muscles for support, protection and movement.
 | **Living things & their habitats*** recognise that living things can be grouped in a variety of ways
* explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment
* recognise that environments can change and that this can sometimes pose dangers to living things.

**Animals*** describe the simple functions of the basic parts of the digestive system in humans
* identify the different types of teeth in humans and their simple functions construct
* interpret a variety of food chains, identifying producers, predators and prey
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| **Chemistry** | **Rocks*** compare and group together different kinds of rocks on the basis of their appearance and simple physical properties
* describe in simple terms how fossils are formed when things that have lived are trapped within rock recognise that soils are made from rocks and organic matter
 | **States of Matter**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)identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature. |
| Physics | **Light*** recognise that they need light in order to see things and that dark is the absence of light
* notice that light is reflected from surfaces
* recognise that light from the sun can be dangerous and that there are ways to protect their eyes recognise that shadows are formed when the light from a light source is blocked by an opaque object find patterns in the way that the size of shadows change.

**Forces*** compare how things move on different surfaces
* notice that some forces need contact between two objects, but magnetic forces can act at a distance observe how magnets attract or repel each other and attract some materials and not others
* compare and group together a variety of everyday materials on the basis of whether they are attracted to a magnet, and identify some magnetic materials
* describe magnets as having two poles predict whether two magnets will attract or repel each other, depending on which poles are facing.
 | **Sound*** identify how sounds are made, associating some of them with something vibrating recognise that vibrations from sounds travel through a medium to the ear find patterns between the pitch of a sound and features of the object that produced it
* find patterns between the volume of a sound and the strength of the vibrations that produced it
* recognise that sounds get fainter as the distance from the sound source increases.

**Electricity*** identify common appliances that run on electricity construct a simple series electrical circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers
* identify whether or not a lamp will light in a simple series circuit, based on whether or not the lamp is part of a complete loop with a battery
* recognise that a switch opens and closes a circuit and associate this with whether or not a lamp lights in a simple series circuit
* recognise some common conductors and insulators, and associate metals with being good conductors.
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|  | Year 5 | Year 6 |
| Biology | **Living things & their habitats*** 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.

**Animals including humans*** describe the changes as humans develop to old age.
 | **Living things & their habitats*** describe how living things are classified into broad groups according to common observable characteristics and based on similarities and differences, including microorganisms, plants and animals
* give reasons for classifying plants and animals based on specific characteristics.

**Animals including humans*** identify and name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood
* recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function
* describe the ways in which nutrients and water are transported within animals, including humans.

**Evolution & inheritance*** recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago
* recognise that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents
* identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution.
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| Chemistry | **Properties & changes of materials*** 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, and describe how to recover a substance from a solution
* use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating
* give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic demonstrate that dissolving, mixing and changes of state are reversible changes
* 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.
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| Physics | **Earth & Space*** describe the movement of the Earth, and other planets, relative to the Sun in the solar system
* describe the movement of the Moon relative to the Earth
* describe the Sun, Earth and Moon as approximately spherical bodies
* use the idea of the Earth’s rotation to explain day and night and the apparent movement of the sun across the sky.

**Forces*** explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object
* identify the effects of air resistance, water resistance and friction, that act between moving surfaces recognise that some mechanisms, including levers, pulleys and gears, allow a smaller force to have a greater effect.
 | **Light*** 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.

**Electricity*** 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.
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