



Curriculum
Progression
Document

Science



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Science
Curriculum
Intent

Acres Hill Community Primary School- Intent

Acres Hill Community Primary Curriculum Intent

At Acres Hill we know that education is fundamental to improving the life chances of our pupils and their families. For all our children, the goal is that they will leave Acres Hill Community Primary School as proficient and confident readers, writers and mathematicians who have a love for learning and an interest in the world in which we live.

For this to occur children also need to be confident, independent and resilient. Our curriculum therefore aims to support the whole child, in order to equip them with academic and interpersonal skills required to be successful, whilst also building aspirations and confidence to dream big and aim high.

In order to accomplish this aim we deliver a broad and balanced curriculum across school. The curriculum is sequenced and rigorous in order to develop and support children's core academic knowledge and skills, whilst also broadening children's understanding of the wider world (and their place in it) so that they are fully equipped to explore and succeed as part of it.

We deliver a curriculum that:

- Gives children the knowledge to flourish in the next stages of their education
- Utilises highly skilled teaching which builds on children's prior learning
- Ensures that learning for children is precise and focused
- Is well sequenced so that knowledge and skills are built upon progressively throughout a child's time in school
- Uses planned opportunities for repetition of learning and the threading of key concepts and ideas
- Supports children to experience their learning in creative and stimulating ways, supporting children to be curious, independent and motivated in their own learning
- Embraces the local area and community, in order to recognise its heritage, local history and geography; as well as its place within the wider world.
- Promotes the supporting of the whole child, to ensure that children are empowered to be physically and emotionally well and able to lead positive and productive lives
- Is aspirational; all staff work to inspire and support children in order to ensure they are aware of the world to be explored and that they are suitably equipped and challenged to do so.

Science Subject Intent

We aim to ensure our children:

- Develop an enquiring mind and analytical thinking skills through an interesting and relevant enquiry-based science curriculum
- Understand that Science continues to change our lives in many ways and learning about scientific knowledge, methods, processes and uses.
- Ensure that children are taught how to, and given the opportunity to practice, questioning, testing and dis/proving their ideas, therefore developing the skills required to be critical and independent thinkers in future learning and vocations.
- Ensure that children are aware of, and understand, key scientific concepts that impact on everyday life and the world at large

Acres Hill Community Primary School- Aspirations

Aspirations for the future;

At Acres Hill, we are always thinking about how to prepare our children for the next stage in their learning journey and beyond. We like to talk to the children about their aspirations and take the time to consider the jobs that a range of the foundation subjects are needed for.

Here are some of the jobs you could aspire to do in the future as a Scientist:

- Veterinarian
- Astronaut
- Animal researcher
- Marine biologist

For more careers, visit the First Careers website to learn more about different job roles linked to your favourite subjects



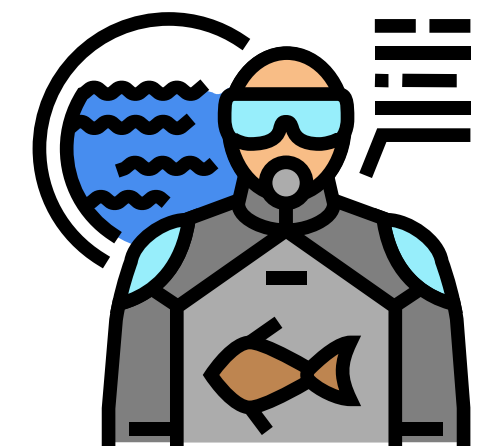
Astronaut



Scientist



Veterinarian



Marine
Biologist

Acres Hill Community Primary School- Enrichment

Wider Curriculum Opportunities & Cultural Capital

Our curriculum extends beyond the National Curriculum and includes a wide range of enriching experiences and opportunities both within and beyond the school day. This can include a programme of clubs, that support the core curriculum offer, as well as those whilst also extending the range of children's experiences (Cultural Capital). A primary focus of our curriculum is to raise aspirations, engender a sense of personal pride in achievement, and provide a purpose and relevance for learning.

The school takes pride in providing a highly inclusive environment, where learners demonstrate high levels of enjoyment in their education and make very good progress across the curriculum. Children at all levels are helped to achieve their potential. Those who are most able are challenged and supported through being offered tasks which provide opportunities for greater depth and those who can struggle are encouraged and given targeted support to embed skills, to develop at their own pace or simply to learn in a style that best suits their individual needs.

We also provide further opportunities to enhance children's learning wherever possible. These can include:

Whole School Theme Days/Weeks

Throughout the year, themed days/weeks are woven into the curriculum to extend the breadth and balance of opportunities we offer our pupils. These include, Anti-bullying, eSafety Day, World Book Day, Red Nose Day and Comic Relief.

Educational Visits and Residentials

School trips and visits are an integral part of the education of children at Acres Hill. We value the opportunities such visits offer our pupils and the commitment of staff and adults undertaking them. Trips include class visits aimed at bringing learning alive and providing first-hand experience; extra-curricular outings such as activities such as author visits, trips to the theatre, sporting events; and attending or taking part in performances or competitions.

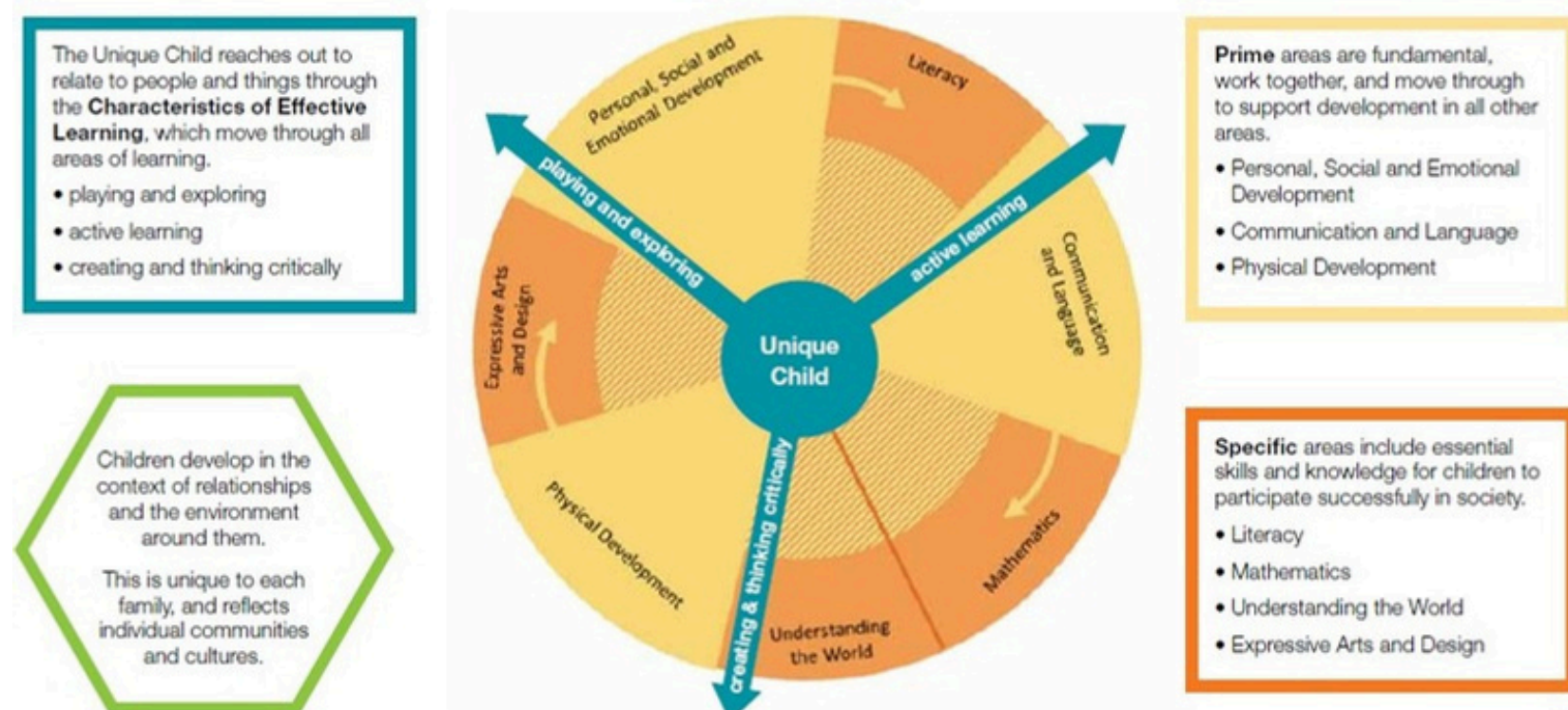
Children in Y2, Y4 & Y6 take part in a residential visit. These are planned to provide new and exciting experiences. Children in Year 2 and Year 4 go on a residential visit and Year 6 take part in an outdoor pursuits residential where they experience a range of activities such as orienteering, climbing, abseiling, raft building, archery and lots more.



Science in the Early Years Foundation Stage

Developing Early
Scientific Skills

Developing Early Scientific Skills



Each area of the EYFS curriculum has an Early Learning Goal, which is the standard that a child is expected to achieve by the end of their reception year. The ELG (Early Learning Goals) covers all of the 7 areas of learning as specified in the Early Years Foundation Stage Curriculum.

The following link to the teaching and learning of science in our EYFS:

ELG 15: The Natural World

Children at the expected level of development will:

- Explore the natural world around them, making observations and drawing pictures of animals and plants;
- Know some similarities and differences between the natural world around them and contrasting environments, drawing on their experiences and what has been read in class;
- Understand some important processes and changes in the natural world around them, including the seasons and changing states of matter.



Science and the National Curriculum

Science and the National Curriculum: Key Stage One

The principal focus of science teaching in key stage 1 is to enable pupils to experience and observe phenomena, looking more closely at the natural and humanly constructed world around them. They should be encouraged to be curious and ask questions about what they notice. They should be helped to develop their understanding of scientific ideas by using different types of scientific enquiry to answer their own questions, including observing changes over a period of time, noticing patterns, grouping and classifying things, carrying out simple comparative tests, and finding things out using secondary sources of information. They should begin to use simple scientific language to talk about what they have found out and communicate their ideas to a range of audiences in a variety of ways. Most of the learning about science should be done through the use of first-hand practical experiences, but there should also be some use of appropriate secondary sources, such as books, photographs and videos.

‘Working scientifically’ is described separately in the programme of study but **must always** be taught through and clearly related to the teaching of substantive science content in the programme of study. Throughout the notes and guidance, examples show how scientific methods and skills might be linked to specific elements of the content.

Pupils should read and spell scientific vocabulary at a level consistent with their increasing word reading and spelling knowledge at key stage 1.

Pupils should be taught about:

- Working scientifically by asking simple questions and recognising that they can be answered in different ways, observing closely, using simple equipment, performing simple tests, identifying and classifying, using their observations and ideas to suggest answers to questions, gathering and recording data to help in answering questions.

Year 1

- 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.
- 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.
- 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.

Science and the National Curriculum: Key Stage One

Pupils should be taught to:

- Observe changes across the four seasons.
- Observe and describe weather associated with the seasons and how day length varies.

Year 2

- 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 micro- habitats.
- 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.
- 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.
- 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.
- 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.

Science and the National Curriculum: Lower Key Stage Two

The principal focus of science teaching in lower key stage 2 is to enable pupils to broaden their scientific view of the world around them. They should do this through exploring, talking about, testing and developing ideas about everyday phenomena and the relationships between living things and familiar environments, and by beginning to develop their ideas about functions, relationships and interactions. They should ask their own questions about what they observe and make some decisions about which types of scientific enquiry are likely to be the best ways of answering them, including observing changes over time, noticing patterns, grouping and classifying things, carrying out simple comparative and fair tests and finding things out using secondary sources of information. They should draw simple conclusions and use some scientific language, first, to talk about and, later, to write about what they have found out.

‘Working scientifically’ is described separately at the beginning of the programme of study but must **always** be taught through and clearly related to substantive science content in the programme of study. Throughout the notes and guidance, examples show how scientific methods and skills might be linked to specific elements of the content.

Pupils should read and spell scientific vocabulary correctly and with confidence, using their growing word reading and spelling knowledge.

Pupils should be taught about:

During years 3 and 4, pupils should be taught to use the following practical scientific methods, processes and skills through the teaching of the programme of study content:

- Asking relevant questions and using different types of scientific enquiries to answer them.
- Setting up simple practical enquiries, comparative and fair tests.
- Making systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers.
- Gathering, recording, classifying and presenting data in a variety of ways to help in answering questions.
- Recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables.
- Reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions.
- Using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions.
- Identifying differences, similarities or changes related to simple scientific ideas and processes.
- Using straightforward scientific evidence to answer questions or to support their findings.

Science and the National Curriculum: Lower Key Stage Two

Pupils should be taught to:

Year 3

- 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.
- 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.
- 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.
- 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.
- 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.

Year 4

- 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.
- 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 and interpret a variety of food chains, identifying producers, predators and prey.
- 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.
- Identify how sounds are made, associating some of them with something vibrating

Science and the National Curriculum: Lower Key Stage Two

- 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.
- 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.

Science and the National Curriculum: Upper Key Stage Two

The principal focus of science teaching in upper key stage 2 is to enable pupils to develop a deeper understanding of a wide range of scientific ideas. They should do this through exploring and talking about their ideas; asking their own questions about scientific phenomena; and analysing functions, relationships and interactions more systematically. At upper key stage 2, they should encounter more abstract ideas and begin to recognise how these ideas help them to understand and predict how the world operates. They should also begin to recognise that scientific ideas change and develop over time. They should select the most appropriate ways to answer science questions using different types of scientific enquiry, including observing changes over different periods of time, noticing patterns, grouping and classifying things, carrying out comparative and fair tests and finding things out using a wide range of secondary sources of information. Pupils should draw conclusions based on their data and observations, use evidence to justify their ideas, and use their scientific knowledge and understanding to explain their findings.

‘Working and thinking scientifically’ is described separately at the beginning of the programme of study but must **always** be taught through and clearly related to substantive science content in the programme of study. Throughout the notes and guidance, examples show how scientific methods and skills might be linked to specific elements of the content.

Pupils should read, spell and pronounce scientific vocabulary correctly.

Pupils should be taught about:

- Planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary.
- Taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate.
- Recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs.
- Using test results to make predictions to set up further comparative and fair tests.
- Reporting and presenting 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.
- Identifying scientific evidence that has been used to support or refute ideas or arguments.

Science and the National Curriculum: Upper Key Stage Two

Pupils should be taught to:

Year 5

- 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.
- Describe the changes as humans develop to old age.
- 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.
- 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.
- 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.

Year 6

- Describe how living things are classified into broad groups according to common observable characteristics and based on similarities and differences, including micro- organisms, plants and animals.
- Give reasons for classifying plants and animals based on specific characteristics.
- 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.
- 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.
- 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.

Science and the National Curriculum: Upper Key Stage Two

- 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.



Implementation of Whole School Science

Programme of Study

Acres Hill's Science Programme of Study

		Key Concept			
Year Group	Enquiry Question	Biology	Physics	Chemistry	Earth Science
1	Do all animals have the same parts?				
1	What is it like in each season? (Autumn & Winter)				
1	What are the objects I use made from?				
1	What is it like in each season? (Spring & Summer)				
1	How can plants be identified?				
2	How could you survive on a desert island?				
2	How do we choose materials?				
2	What lives in a place like this?				
2	What makes a plant a living thing?				
3	Are all rocks the same?				

Acres Hill's Science Programme of Study

		Key Concept			
Year Group	Enquiry Question	Biology	Physics	Chemistry	Earth Science
3	Are magnets useful?				
3	How do bones and muscles work together to create movement?				
3	What does a plant need to grow and survive?				
3	Why can't we see in the dark?				
4	What are states of matter?				
4	What do our bodies do with the food we eat?				
4	What makes living things different?				
4	How does electricity flow?				
4	How is sound created?				

Acres Hill's Science Programme of Study

		Key Concept			
Year Group	Enquiry Question	Biology	Physics	Chemistry	Earth Science
5	How can materials be changed?				
5	How do forces help us?				
5	Why does the sun appear to move across the sky?				
5	Do all lifecycles look the same?				
5	How do we grow old?				
6	Is a simple circuit good enough?				
6	Why did the peppered moths change colour over time?				
6	Is all bacteria bad?				
6	How do our choices affect our bodies?				
6	How do we see?				



Implementation of Whole School Science

Progression of Knowledge
& Skills

Progression of Knowledge & Skills- Concepts

At Acres Hill, we aim to develop the following concepts through the progressive teaching of scientific knowledge, skills and understanding. These essential threshold concepts are based on the requirements of the National Curriculum Programme of Study for Key Stage One and Key Stage two.

We encourage our children to develop an enquiring mind and analytical thinking skills through an interesting and relevant enquiry-based science curriculum. Science continues to change our lives in many ways and learning about scientific knowledge, methods, processes and uses. These provide the foundations for understanding the world in which we live today and for the future.

Science Concepts

- **Biology**

Pupils will develop an understanding of **living things and their environments** through the study of animals, humans, plants and habitats. They will learn about reproduction, **inheritance and evolution** through the study of life processes and life cycles.

- **Chemistry**

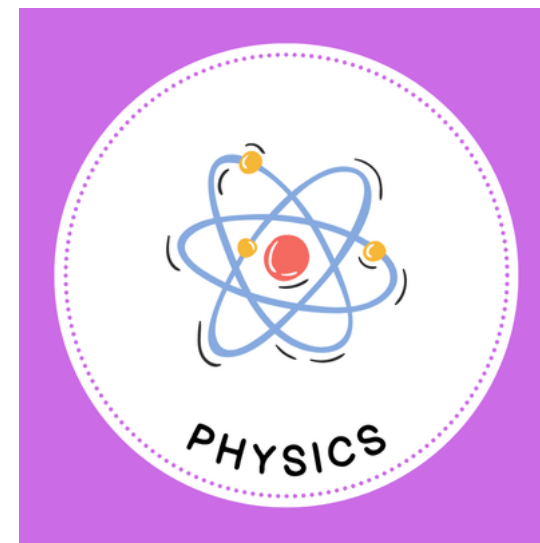
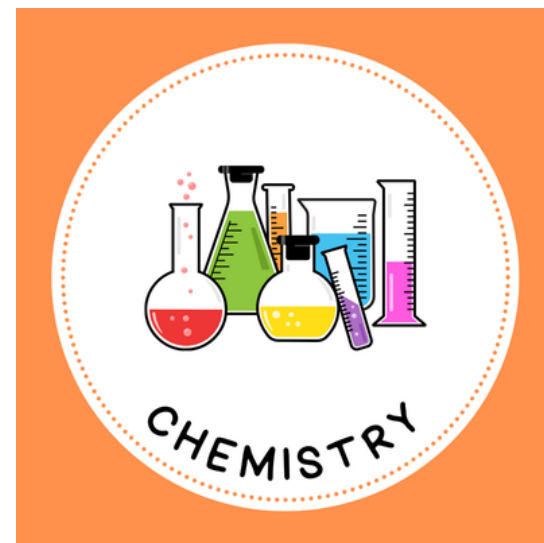
Pupils will learn about **states of matter** through the study of solids, liquids and gases. They will look at the **properties of materials** including **rocks** and fossils and will study reversible and irreversible changes in materials.

- **Physics**

Pupils will develop an understanding of the concepts and laws that apply to physics. They will study the concept of energy by learning about **light, sound** and **electricity**. They will develop an understanding of **forces** by studying and investigating friction, air resistance, gravity and magnets.

- **Earth Science**

Pupils will learn about **Earth and Space**, studying seasons, day and night, the solar system and beyond.



Implementation

Progression of Knowledge- Key Stage One

	Year 1	Year 2
Autumn 1	Do all animals have the same parts? Key concept: Biology Substantive knowledge: • The five animal groups are mammals, birds, fish, reptiles, and amphibians. • Animals have different body parts and skin coverings such as birds have wings, feathers and claws etc. • Carnivores eat animals/ Herbivores eat plants / omnivores eat both animals and plants. • The five senses are smell (nose), taste (tongue), touch (skin), see (eyes), and hear (ears)	How could you survive on a desert island? Key concept: Biology Substantive knowledge: • All animals need water, food, shelter, oxygen, and temperature to meet their basic needs. • All animals reproduce. This means having offspring. • Humans need to exercise. It builds our muscles and helps to pump blood around our body. • It is important that humans eat a balanced diet with all the right nutrients (carbohydrates, fruit and vegetables, oils and spreads, proteins, and dairy) • Being hygienic stops the spread of germs which can cause diseases.

Progression of Knowledge- Key Stage One

	Year 1	Year 2
Autumn 2	What is it like in each season? (Autumn & Winter) Key concept: Earth Science Substantive knowledge: • Seasons are the different times in the year when there are changes in the weather. • In the United Kingdom, there are four seasons in a year: autumn, winter, spring, and summer. • Winter is the coldest season and Summer is the warmest season. • The length of the days changes as well as what happens in the world around us.	

Progression of Knowledge- Key Stage One

	Year 1	Year 2
Spring 1	What are the objects I use made from? Key concept: Chemistry Substantive knowledge: • Materials are the substances that things are made from. • We use lots of different materials every day, e.g. metal, plastic, wood, and glass. • A property is a quality that describes what something is like or how it behaves. • Different materials have different physical properties which make them useful for different things.	How do we choose materials? Key concept: Chemistry Substantive knowledge: • Materials are the substances that things are made from. • Different materials have different properties: they behave or do things in different ways. • The shape of some materials can be changed by squashing, bending, twisting, or stretching them.

Progression of Knowledge- Key Stage One

	Year 1	Year 2
Spring 2	What is it like in each season? (Spring & Summer) Key concept: Earth Science Substantive knowledge: • Seasons are the different times in the year when there are changes in the weather. • In the United Kingdom, there are four seasons in a year: autumn, winter, spring, and summer. • Winter is the coldest season and Summer is the warmest season. • The length of the days changes as well as what happens in the world around us.	What lives in a place like this? Key concept: Biology Substantive knowledge: • All around us there are some things that are alive, somethings that are dead, and some things that have never been alive. • All living things have certain characteristics that help to keep them alive and healthy. • There are several different habitats, Ocean, Rainforest, Desert, Woodland and Polar. • Micro-habitats are small, areas that are part of a bigger habitat. They contain features that make them suitable to the things that live there, e.g. food, shelter, or temperature. • Every living thing needs food in order to create energy. This process is called nutrition. • A food chain shows how energy from food is passed along. • Living things depend on other living things in order to survive

Progression of Knowledge- Key Stage One

	Year 1	Year 2
Summer 1	How can plants be identified? Key concept: Biology Substantive knowledge: • People grow flowering plants which are beautiful to look at or beans and seeds to grow plants for food. • A wild plant will grow by itself and does not need to be cared for. • Deciduous trees lose their leaves in the autumn every year. • Evergreen trees have green leaves all year round. • Common parts of a flowering plant are flower, leaf, stem, and roots. • Common parts of a tree are roots, trunk, branches, leaves.	What makes a plant a living thing? Key concept: Biology Substantive knowledge: • Plants need water and nutrients, light, temperature (warmth) and space and time to grow. • Germination is the name for when a plant starts to grow. • When a plant germinates it begins to grow a sprout. • Plants have a life cycle that helps keep new plants growing (seed/bulb – seedling – flowering/fruit)

Progression of Knowledge- Key Stage Two

	Year 3	Year 4	Year 5	Year 6
Autumn 1	Are all rocks the same? Key concept: Chemistry Substantive knowledge: • Rocks can be classified into four categories: sedimentary, Igneous, Metamorphic and Meteorite. • Each type of rock has different physical properties which means they can be used for purposes. • A fossil is the preserved remains of something that was once living. • The process in which fossils are formed is called fossilisation. • Soil is a combination of different materials, including ground up pieces of rock, particles from dead plants and animals, air, and soil.	What are states of matter? Key concept: Chemistry Substantive knowledge: • All matter exists in three states: solids, liquids, and gases. • Solids hold their shape, are rigid and have a fixed volume. • Liquids do not hold their shape, have a fixed volume but aren't rigid and can be poured. • Gases do not hold their shape, are not rigid and do not have a fixed volume. • States of matter can change, depending upon the temperature of the matter. • There are four changing states: freezing, melting, evaporation and condensation. • Changing states of matter plays an important part in the water cycle: 1. Evaporation- Energy from the sun heats up the surface of the Earth. This causes the temperature in rivers, lakes, and oceans to rise, and the water rises into the air as water vapour. 2. Condensation - As the water vapour rises, it cools in the higher air and turns back into liquid - condensation. This creates clouds.	How can materials be changed? Key concept: Chemistry Substantive knowledge: • Materials can be grouped by their properties such as being an electrical conductor, magnetic, transparent or hardness. • Some materials will dissolve in a liquid and form a solution. • A solution is a specific type of mixture where one substance is dissolved into another, and each part stays evenly mixed. • Some materials are insoluble and form a sediment. • A solvent is a substance that dissolves a solid, liquid, or gaseous solute. • There are many ways in which materials can be changed, for example through heating, cooling, mixing with other substances. • Some changes can be reversed, the material can be returned to its previous form. • Other changes are irreversible. This means that the change cannot be 'undone.' • Changes that involve the formation of new materials, for example baking a cake, are not normally reversible.	Is a simple circuit good enough? Key concept: Physics Substantive knowledge: • When changes are made to circuits, components can function differently: • When switches are open or wires are removed from a circuit it is no longer a closed circuit so bulbs, motors and buzzers will turn off as the circuit is not complete. • When more batteries or cells are added or batteries are included with a higher voltage the brightness of bulbs and the volume of buzzers will increase. • When more bulbs are added to a simple circuit, they will be dimmer than if there were one bulb. This is because the electricity is shared between the bulbs. • More voltage would be needed to make them brighter. Using more than one motor or buzzer will make them spin more slowly or they will be quieter for the same reason • When drawing electrical circuits, there are some standard symbols to show the different components.

Progression of Knowledge- Key Stage Two

	Year 3	Year 4	Year 5	Year 6
Autumn 2	Are magnets useful? Key concept: Physics Substantive knowledge: • Forces are pushes and pulls. • These forces change the motion of an object, it can start to move it, speed it up, slow it down or stop it. • Forces act in opposite directions to each other. • Friction is a force that holds back the motion of an object. • A magnet is a piece of material that attracts magnetic materials toward it. • When objects enter the magnetic field, they are attracted to or repelled from the magnet if they are magnetic. • The ends of a magnet are called poles. One end is called the north pole, and the other end is called the south pole. • Opposite poles attract, similar poles repel.	What do our bodies do with the food we eat? Key concept: Biology Substantive knowledge: • There are 3 main stages of the digestive system- Ingestion / Absorption / Excretion • Humans have up to 32 adult teeth, made up of 4 different types. - o Incisors- to cut food. - o Canines- to tear food. - o Pre-molars- to crush food. - o Molars- to grind food • Food chains begin with plant life, and end with animal life. • Producers are able to make their own food - plants do this through photosynthesis. • Primary consumers are animals that eat producers. • Secondary consumers are animals that eat primary consumers. • Tertiary consumers are animals that eat secondary consumers. • At the top are apex predators - animals which have no natural predators that eat them.	How do forces help us? Key concept: Physics Substantive knowledge: • Everything is pulled to the Earth by the force gravity. • The bigger an object's mass, the more gravity it will have. The smaller the mass of an object, the less gravity it will be subject to. • Forces cause an object to start moving, speed up, slow down or change direction. • There are different forces that affect us such as applied force, friction, air resistance, water resistance and surface resistance. • A mechanism is a device that allows a small force to be increased to a larger force. • Levers give us extra pushing or pulling force and help us lift greater weights. • Gears are different sized cogs which work together to give a machine extra force. • Pulleys are wheels and ropes that work together to lift heavy objects.	Why did the peppered moths change colour over time? Key concept: Biology Substantive knowledge: • Evolution is a change over time. It occurs when there is competition to survive (natural selection) • Fossils are the remains of living things, found in sedimentary rocks which provide evidence about living. • Living things produce offspring of the same kind. • Some of a parent's characteristics are passed down to the offspring - this is called inheritance. • Inheritance is genetic, not environmental. • Evolution and natural selection have enabled living things to adapt to their habitat. • If environments change rapidly, some variations of species may not suit the new environment and will die. If the environment changes slowly, animals and plants with variations that are best suited survive in greater numbers.

Progression of Knowledge- Key Stage Two

	Year 3	Year 4	Year 5	Year 6
Spring 1	How do bones and muscles work together to create movement? Key concept: Biology Substantive knowledge: • Humans (and many other animals) have a system of bones called a skeleton. • The three most important things a skeleton does are: - o support and shape. - o allow movement. - o protect organs. • Animals that have a skeleton are called vertebrates. It can be on the inside or the outside of the body. • Endoskeletons are inside of the body. • Exoskeletons are outside of the body. • Humans and many other animals also have a system of muscles in their bodies, the main purpose is for movement.	What makes living things different? Key concept: Biology Substantive knowledge: • A classification key is a tool that is used to group living things to help us identify them. • All living things, which can also be called organisms, have to do certain things to stay alive. These are the life processes. • Living things can be grouped according to different criteria (where they live, what type of organism they are, what features they have) • Habitats can change throughout the year and this can have an effect on the plants and animals that live there. • Humans can have positive and negative effects on the environment.	Why does the sun appear to move across the sky? Key concept: Earth Science Substantive knowledge: • The sun is a star: a huge ball of hot gas that gives off light and heat. • The Earth and all the planets in the Solar System orbit the Sun. • It takes the Earth just over 365 days to make one complete orbit around the sun - this is one year. The Earth and the other planets are held in place around the Sun by gravity - the same force that keeps you on the Earth! • The Earth is always spinning around. When a point on Earth is facing the Sun, it is daytime. When facing away, it is night time. • It takes 24 hours for the Earth to complete a spin. As it rotates, the Sun appears to move across the sky. • Some objects orbit around the planets. These are called moons. The Earth has one moon. The Moon is much smaller than the Earth. It takes 28 days to complete its orbit.	Is all bacteria bad? Key concept: Biology Substantive knowledge: • All living things must do certain things to stay alive. These are known as life processes. • The classification of animals is when living things are formally grouped according to their characteristics. • Vertebrates are mammals, reptiles, amphibians, fish, and birds. • Invertebrates are creatures that do not have a spine such as snails, slugs, worms, spiders, and insects. • Plants can be classified based on being a flowering or non-flowering plant. • There are other living things that do not fit into the two main groups of animals and plants such as micro-organisms such as bacteria and yeast, toadstools, and mushrooms. • Some microbes can be harmful to humans and can cause disease: some microbes can be useful to the body.

Progression of Knowledge- Key Stage Two

	Year 3	Year 4	Year 5	Year 6
Summer 1	What does a plant need to grow and survive? Key concept: Biology Substantive knowledge: • The roots grow into the ground- they are responsible for getting water and minerals to the plant as well as anchoring it to the ground. • The stem/trunk carries the water and nutrients up to the leaves. • Leaves use sunlight, air, and water to produce the plant's food. • The flower has male and female parts which work together to make seeds. • All seeds need soil, water, oxygen, and the right temperature before they will grow. • Seeds are dispersed in different ways such as through an animal's digestive system or by wind.	How does electricity flow? Key concept: Physics Substantive knowledge: • Electricity is a type of energy which is used to power lots of different things including items that we use in everyday life. • A simple electrical circuit needs a cell, battery, connections, and an output (light or sound) • A switch is a small control that you use to turn a device on or off. • When they are placed in a circuit, some materials allow electricity to pass freely through them. These are called electrical conductors. Metal is a good conductor. • When they are placed in a circuit, some materials do not allow electricity to pass freely through them. These are called electrical insulators.	Do all lifecycles look the same? Key concept: Biology Substantive knowledge: • A life cycle is the series of changes that an animal goes through in its life. • Mammals and birds have a 3-stage life cycle. • Many amphibians have a 5-stage life cycle. • Most insects undergo metamorphosis and have a 4-stage life cycle. • Plants can reproduce in two ways - sexual reproduction and asexual reproduction. • Sexual reproduction in plants is cyclical. • Asexual reproduction involves plants producing an identical copy of themselves.	How do we see? Key concept: Physics Substantive knowledge: Light originates from light sources. Light travels in a straight line from light sources. We see things because... a. there is a light source sending light into our eyes, or b. light is reflected from a light source off a surface and into our eyes. When an object passes in front of a ray of light the light can be blocked, creating a shadow the same shape as the object. Opaque objects let no light through, creating a dark shadow. Translucent objects let some light through creating a fainter shadow. Transparent objects let all light through creating no shadow.

Progression of Knowledge- Key Stage Two

	Year 3	Year 4	Year 5	Year 6
Summer 2	Why can't we see in the dark? Key concept: Physics Substantive knowledge: • Light is a form of energy that make it possible to see. • Light is given off by some objects, for example the sun. Darkness is when there is no light. • Light can reflect off surfaces like mirrors. • Some types of light, particularly the sun, can be dangerous for our eyes and skin. This is because they contain UV rays that can cause damage. • Shadows are formed when light is blocked by an opaque object.	How is sound created? Key concept: Physics Substantive knowledge: • Sounds are made when objects vibrate - shake back and forth creating soundwaves which travel to the ears. • Pitch is the highness or lowness of a sound which is caused by the frequency of vibrations. • The higher the rate of vibrations, the higher the pitch. These have tight, short frequency waves. • Lower pitch sounds have a lower rate of vibrations. They are looser, spaced-out waves. • Volume is the loudness of a sound which depends on the amount of energy that the vibrations contain. • Sounds gets fainter as the distance from the sound source increases.	How do we grow old? Key concept: Biology Substantive knowledge: • When babies are born they are very dependent on their parents. As they grow into infants and children they undergo rapid change. • Puberty is when a child's body begins to grow, change, and develop as they become an adult. Puberty happens when the pituitary glands begin to release hormones. • As adults get older their bodies undergo more changes.	How do our choices affect our bodies? Key concept: Biology Substantive knowledge: • The circulatory system is made up of your heart, blood, and blood vessels. • The human body needs a constant supply of blood to keep working. • The heart is an organ that works constantly to pump blood around the body. • Diet, exercise, drugs and lifestyle have an impact on the way our body functions. They can affect how well our bodies work, how clearly we think, and generally how fit and well we feel. • People who eat the right balance of fresh, healthy foods are less prone to chronic illnesses and diseases.

Progression of Skills- Working Scientifically

Disciplinary Knowledge:	EYFS	Key Stage One	Lower Key Stage Two	Upper Key Stage Two
Observation over time	Nursery and Reception I can make observations and explain what I can see	Year One - I can use observations and ideas to suggest answers to questions Year Two - I can observe changes over time - I can ask questions about what I notice	Year Three & Year Four - I make careful and systematic observations and take accurate measurements using standard units - I can use results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions - I can record findings using bar charts keys, tables and labelled diagrams	Year Five - I can take measurements, using a wider range of scientific equipment, with increasing accuracy and precision and taking repeat reading when appropriate - I can report and present findings from enquiries including conclusions, explanations, data and diagrams including line graphs. Year Six - I use a range of scientific equipment to take accurate and precise measurements or readings, with repeat readings where appropriate - I ask my own questions about the scientific phenomena that I am studying, and select the most appropriate ways to answer these questions including observing changes over different periods of time - I draw conclusions, explain and evaluate my methods and findings, communicating these in a variety of ways

Progression of Skills- Working Scientifically

Disciplinary Knowledge:	EYFS	Key Stage One	Lower Key Stage Two	Upper Key Stage Two
Identifying, grouping and classifying	Nursery and Reception I can sort objects into groups	Year One - I can identify and classify according to simple criteria - I can perform simple tests, involving observations and the gathering and recording of data Year Two - I can group and classify things - I can use different types of Scientific enquiry to gather and record data, using simple equipment - I notice patterns in my observations or data	Year Three & Year Four - I can gather, record, classify and present information in a variety of different ways to help me answer questions - I can identify differences, similarities or changes related to simple scientific ideas and processes	Year Five - I ask my own questions about the scientific phenomena that I am studying, and select the most appropriate ways to answer these questions, recognising and controlling variables and noticing patterns Year Six - I ask my own questions about the scientific phenomena that I am studying, and select the most appropriate ways to answer these questions, recognising and controlling variables and grouping and classifying things

Progression of Skills- Working Scientifically

Disciplinary Knowledge:	EYFS	Key Stage One	Lower Key Stage Two	Upper Key Stage Two
Comparative and fair testing		Year One and Year Two I can carry out simple comparative tests	Year Three & Year Four - I can ask relevant questions and use different types of scientific enquiry to answer them, including comparative and fair tests - I can record findings and present data using simple scientific language, explanations, diagrams, pictures, keys, bar charts and tables.	Year Five - I can plan and carry out scientific enquiry using a range of scientific equipment and variables in order to answer questions - I can use test results to make predictions to set up further comparative and fair tests Year Six - I ask my own questions about the scientific phenomena that I am studying, and select the most appropriate ways to answer these questions, recognising and controlling variables where necessary and carrying out comparative and fair tests - I draw conclusions, explain and evaluate my methods and findings, communicating these in a variety of ways

Reading in Science

At Woodhouse West, reading is at the heart of the curriculum. It is our intent to ensure that every child not only develops the skills of reading but also a love of reading that will last them a lifetime. Our children read at home and school for pleasure, for information and to expand and enhance their knowledge and understanding across all subjects. Our children not only learn to read, they read to learn. Appropriate opportunities are taken to enhance children's learning in science through reading with the use of high-quality texts across a wide range of genres.

These are matched to each topic in each year group, in order to impact on learning in the following ways:

- Knowledge of an extensive and subject-specific vocabulary.
- Fluency and accuracy in reading across a wide range of contexts throughout the curriculum.
- The motivation to read for both study and for pleasure.
- Extensive knowledge through having read a rich and varied range of texts.
- Excellent phonic knowledge and skills.
- An excellent comprehension of texts.
- A desire to embrace challenging activities, including opportunities to undertake high-quality research across a range of scientific topics.
- The ability to think, reflect, debate, discuss and evaluate scientific thinking and discoveries.
- The ability to consistently support, evaluate and challenge their own and others' views using detailed, appropriate and accurate scientific evidence and facts.

Implementation

SMSC in Science

SMSC within the curriculum

SMSC is not a lesson which is taught in isolation, it is interwoven throughout our curriculum. Sometimes science and spiritual ideas do cause conflict but in a modern society it is important to understand why these conflicts arise so we can respect the views of others and move forward. It is seen more often that science is able to stand alongside the spiritual beliefs of many. This is looked at often from a neutral stand point within science lessons. Staff are able to enhance teaching and learning by modelling respectful language and attitudes and making strategic decisions about the content of curriculum lessons that involve the children. Where appropriate, particular articles or areas of SMSC are linked to areas of history to provide children with a broad knowledge and understanding.

What impact does this have?

Due to the fact SMSC development is integrated into our broad and balanced curriculum, children understand the importance of their SMSC key skills and it becomes a fundamental part of our school ethos. We have found that bringing a SMSC perspective to areas of the curriculum can enhance and enrich learning and instil a respectful ethos within our school. By ensuring that children have a rich SMSC understanding, we ensure that they are ready to embrace the challenges of creating a happy and successful adult life in modern Britain.

Implementation