



Science at HPF Overview

'Celebrating and inspiring a lifelong love of learning in an ever changing world'

Rationale

Science at HPF contributes to our Federation vision and values. Our science curriculum provides a wide range of multi-sensory experiences, which engage, motivate and inspire deep learning and inspiration for life-long learning. At the core of our Science provision is the National Curriculum and a corresponding progression of key skills and knowledge. This helps us to ensure that our children receive a progressively challenging and engaging education that is in context for the Hanham Primary Federation community. Science is valued at the Hanham Primary Federation as a vital means for enabling children to understand and make sense of the world around them.

We believe Science enquiry should be thoughtful and creative, enabling children of all ages to be **INSPIRED** by imaginative, constructive and meaningful learning. Our high-quality Science education inspires our pupils with a curiosity and fascination about the world around them and the scientific concepts which underpin it. We teach the children to **CELEBRATE** significant scientists of the past and current scientific issues in the world today. We believe this allows the children to see the importance of the subject and **INSPIRE** them to consider themselves as a future scientist.

Through building up a body of key foundational knowledge and concepts, pupils are encouraged to recognise the power of rational explanation and develop a sense of **ENJOYMENT** and curiosity about natural phenomena. They are encouraged to understand how science can be used to explain what is occurring, predict how things will behave, and analyse causes. This scientific enquiry is encouraged through all topics, often being linked to cross curricular tasks.

Children are supported and encouraged to build up a comprehensive scientific vocabulary – understanding both scientific terms found in common language alongside technical vocabulary which they are use with confidence. Science links coherently with our English and Maths curriculums, allowing children to explore how Maths and Science complement each other and how precise and accurate use of language are key to scientific writing.

Our Science curriculum fulfils a core value of the Federation by emphasising **RESPECT** for different ideas, asking thought-provoking questions about environmental issues and providing stimulating topics that learners will **ENJOY** as well as requiring learners to engage in challenging tasks that will require **INDEPENDENCE** and **PERSEVERENCE**.



Science at HPF Overview

'Celebrating and inspiring a lifelong love of learning in an ever changing world'

CELEBRATING – INSPIRING – LEARNING

Children are taught to listen and appreciate others explanations and significant scientists work.

We utilise the awe and wonder aspect of science to capture the children's interests and inspiring their thirst for knowledge.

Practical activities enable children to learn from doing and modify their work.

Perseverance

Through scientific enquiry, children will face challenges that will require them to adapt, re-think and adjust to be successful. They may have to repeat experiments multiple times, giving them more data analyse and ensuring a fair test.

Respect

Learners are taught to be respectful to differing views when investigating with particular regards to predictions. We encourage learners to listen to others explanations and ideas with a sensitive scientific ear.

Responsibility

Through curriculum content learners are encouraged to think responsibility about how we look after the world we inhabit and our own bodies. When investigating they take responsibility for conducting a fair test and the equipment they use.

Enjoyment

Children have a natural curiosity about the world around them and are always keen to learn about it. Our curriculum builds on learners' enthusiasm and shows them the skills, attitudes and knowledge needed to make an area they clearly enjoy into a viable potential career.

Independence

Learners hear and discuss scientific ideas and form their own opinions. They are encouraged to make their own decisions and work scientifically to collect results. They are taught the core skills that will allow them to become competent, independent scientific thinkers.

Children will learn about:

Working scientifically: Working scientifically' specifies the understanding of the nature, processes and methods of science for each year group. Working scientifically is embedded within the content of biology, chemistry and physics, focusing on the key features of scientific enquiry, so that pupils learn to use a variety of approaches to answer relevant scientific questions. These types of scientific enquiry include: observing over time; pattern seeking; identifying, classifying and grouping; comparative and fair testing (controlled investigations); and researching using secondary sources. Pupils will seek answers to questions through collecting, analysing and presenting data.

Biology: children will learn about the human body, internally and externally, animals and their habitats, the life cycle and food chains. They will learn about plants and classifying different living things.

Chemistry: chemistry at HPF is integrated through various topics such as changing states of materials (KS1 DT cookery), their properties, states of matter and various parts of biology.

Physics:

- 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;
- Be equipped with the scientific knowledge required to understand the uses and implications of Science, today and for the future.
- Develop the essential scientific enquiry skills to deepen their scientific knowledge.
- Use a range of methods to communicate their scientific information and present it in a systematic, scientific manner, including I.C.T., diagrams, graphs and charts.
- Develop a respect for the materials and equipment they handle with regard to their own, and other children's safety.
- Develop an enthusiasm and enjoyment of scientific learning and discovery.

What does this look like in EYFS?

We recognise that all children at HPF will arrive at school with a vast variety of different experiences and abilities in Science. During their first year at school pupils have the opportunity to explore and gain experience with variety of different ways. They will explore different equipment and materials e.g. sand, water, mud kitchen. They will develop their knowledge of the world around them across the Early Years Curriculum. Science learning is always related to the current topic and will involve basic biology, chemistry and physics. Scientific enquiry is the main teaching method where children will be encouraged to explore and learn through play.

What does this look like in KS1?

Pupils' scientific learning at KS1 is based on the four main strands:

Working scientifically: pupils are taught to use the following practical scientific methods: processes and skills: asking simple questions and recognising that they can be answered in different ways: observing closely, using simple equipment performing simple tests: identifying and classifying.

Life Processes and Living Things: children are taught to identify and name different plants, understand the different parts of a plant and what they need to grow. Children will learn about the needs of animals and humans, they will classify with regards to animal type and what they eat. They will learn about animal habitats, how animals are suited to their environment and how the living the world is linked through food chains.

Materials and Their Properties: Children will identify different materials and describe their properties. They will consider their suitability to different purposes and whether those materials can be altered in any way.

Physical Processes: Children will learn about seasonal changes across the year. They will identify common weather patterns.

What does this look like in KS2?

Pupils' learning is organised into the four main strands:

Working scientifically: pupils are taught how to plan different types of scientific enquiries to answer questions. They will be taking measurements, using a range of scientific equipment. They will be recording data and results using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs. Then using test results to make predictions, reporting and presenting findings, including conclusions, causal relationships and explanations of and degree of trust in results.

Life Processes and Living Things: teaching will include plants, animals including humans, living things and their habitats, Evolution and inheritance. These topics will reinforce and build upon their learning in KS1 and deepen their understanding and knowledge of the world around them. They will consider the impact that they have upon these areas.

Materials and their Properties: chemistry is not taught explicitly but through the following areas: states of matter, properties, rocks and changes of materials. The chemistry element of these topics is used to help children attain a deeper understanding of the material objects that surround them. It will give them the building blocks of knowledge they will require in readiness for their secondary education.

Physical Processes: children will be taught light, sound, forces and magnets, electricity and Earth and Space. These areas encourage children's critical thinking and engineering mind. It gives clear of picture of how we have manipulated the world around us historically and how science plays a role in our day to day life.

Strand						
YR	<ul style="list-style-type: none"> Talking about the weather (daily report) Talking about the microwave cooks the porridge 	<ul style="list-style-type: none"> Seasonal changes (Autumn/Winter) Temperature Melting ice cubes – discussing changes 	<ul style="list-style-type: none"> What is my address – using maps... where do I live? Where in the world is Asia? (China) Experimenting with materials to build houses 	<ul style="list-style-type: none"> Seasonal change (Spring) Growing plants – parts of a plant and what is needed to make it grow Life cycles Ducklings Minibeast investigations 	<ul style="list-style-type: none"> Growth and development of animals – farm trip Cooking bread 	<ul style="list-style-type: none"> Where in the world is Africa? How to travel to a foreign country Worldwide paperchains

Strand	Working Scientifically	Life Processes and Living Things	Materials and their Properties	Physical Processes
Year 1	<ul style="list-style-type: none"> Tell other people about what they have done. Use simple equipment to help them make observations. Explain what they have found out. Put some information in a chart or table. Perform a simple test. Show their work using pictures, labels and captions. Think of some questions to ask. Talk about what they can see, touch, smell, hear or taste. Explain what they have found out. Show their work using pictures, labels and captions. Answer some scientific questions. Give a simple reason for their answers. Record their findings using standard units. 	<ul style="list-style-type: none"> Sort photographs of living things and non-living things. Identify the main parts of the human body and link them to their senses. Name the parts of the human body that they can see. Name the parts of an animal's body. Name a range of domestic animals Point out some of the differences between different animals. Sort photographs of living things and non-living things. Name the parts of an animal's body. Compare the bodies of different animals. Sort some animals by body covering (e.g. scales, fur and skin). Describe how an animal is suited to its environment. Classify common animals. Classify animals by what they eat Name the petals, stem, leaf and root of a plant. Describe the parts of a plant (roots, stem, leaves, and flowers). Sort some plants by size. Recognise deciduous and evergreen trees. Identify and name a range of common plants and trees 	<ul style="list-style-type: none"> Talk about what they can see, touch, smell, hear or taste using their senses. Explain what material objects are made from. Think of some questions to ask and answer some scientific questions. Describe materials using their senses, using specific scientific words. Identify and classify things they observe. Explain what material objects are made from. Explain why a material might be useful for a specific job. Name some different materials. 	<ul style="list-style-type: none"> Observe changes across the four seasons Observe and describe weather associated with the seasons and how day length varies.

Year 2

- 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.

- Match certain living things to the habitats they are found in.
- Describe a range of different habitats.
- Identify and compare a variety of plants and animals found in different habitats and microhabitats.
- Describe how a habitat provides for the basic needs of things living there.
- Describe what animals need to survive?
- Collect weather data about a local habitat and use it to explain the plants and animals they will find there.
- Compare how plants grow in different conditions by making measurements.
- Describe how seeds and bulbs grow into plants.
- Explain that plants grow and reproduce.
- Describe what a plant needs to grow and stay healthy.
- Describe some of the life processes common to plants and animals, including humans.
- Describe the life cycle of some living things (e.g. egg, chick, chicken).
- Describe how plants and animals are suited to their habitat.
- Describe what plants need to survive.
- Explain how animals get their food and draw a simple food chain.
- Explain why animals have offspring.
- Explain that animals grow and reproduce
- Explain the differences between living and non-living things.
- Decide whether something is living, dead or non-living.
- Explain the basic needs of animals, including humans.
- Sort living things into groups and say why they sorted them in that way.

- Identify, name, describe and classify materials
- Compare properties of different materials
- Explore the practical uses of everyday materials
- Distinguish between an object and the material from which it is made.
- Identify and name a range of everyday materials? (wood, plastic, metal, water, rock).
- Describe the simple physical properties of a variety of everyday materials.
- Compare and classify a variety of materials based on their simple physical properties.
- Explore how the shapes of solid objects can be changed (squashing, bending, twisting, stretching).
- Identify and compare the uses of a range of everyday materials (wood, metal, plastic, glass, brick/rock, paper/cardboard).
- Identify and compare the uses of a range of everyday materials (wood, metal, plastic, glass, brick/rock, paper/cardboard).
- Describe the simple physical properties of a variety of everyday materials.
- Explain how things move on different surfaces.
- Describe the simple physical properties of a variety of everyday materials.
- Compare and classify a variety of materials based on their simple physical properties.

Year 3

- 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.

- 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.
- 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

- 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.
- 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.

- 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.
- 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.

<p>Year 4</p>	<ul style="list-style-type: none"> • 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. 	<ul style="list-style-type: none"> • Can they identify and name the basic parts of the human digestive system? • Can they describe the function of the organs of the human digestive system? • Can they identify the simple function of different types of human teeth? • Can they compare the teeth of herbivores and carnivores? • Can they explain what a simple food chain shows? • Can they use a classification key to group a variety of living things? (plants, vertebrates, invertebrates) • Can they compare the classification of common plants and animals to living things found in other places? (under the sea, prehistoric) • Can they name and group a variety of living things based on feeding patterns? (producer, consumer, predator, prey, herbivore ,carnivore ,omnivore). • Do they recognise that environments can change and this can sometimes pose a danger to living things? 		<ul style="list-style-type: none"> • Can they describe a range of sounds and explain how they are made? • Can they compare sources of sound and explain how the sounds differ? • Can they explain how to change a sound (louder/softer)? • Can they describe and explain how a sound travels from a source to our ears • Can they explain what happens to sound as it travels away from its source? • Can they explain how you could change the pitch of a sound? • Can they investigate how different materials can affect the pitch and volume of sounds? • Circuits & Conductors • Can they explain how electricity is useful to us? • Can they construct a simple circuit? • Can they explain what a conductor is and test materials for conductivity. • Can they explain closed and open circuits? • Can they construct a circuit with a switch? • Can they recognise some common conductors and insulators? • Can they compare and group materials based on their states of matter, ie, liquid, solid or gas? • Can they explain what happens to materials when they are heated or cooled? • Can they measure the temperature at which different materials change state? • Can they use measurements to explain changes to the state of water? • Can they explain the part that evaporation and condensation has in the water cycle?
----------------------	--	--	--	---

Year 5

- 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.
- 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
 - 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.
 - Plan different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary
 - Give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic
 - Taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate
- 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.
 - 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.

Year 6

- 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.

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

- 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
- 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