Science

INTENT – To what do we aspire for our children?

-Vision -Design -Aspirations for our curriculum

Our Vision

'We are a Family of Friends who LEARN together.'

Our Goal

Our vision for excellence within our science curriculum is created in line with the National Curriculum Purpose of Study. Our aim is for children to:

- 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

In order to do this we will:

- build on the children's natural curiosity about the world around them
- teach the children scientific knowledge
- teach the children scientific skills
- teach scientific skills alongside scientific concepts
- ensure children develop and apply their knowledge and understanding of scientific concepts to their everyday lives
- embed a rich cultural capital of real contexts: practical opportunities, scientific jobs and diverse scientists
- ensure learning is connected across year groups and key stages to allow children to commit knowledge, skills and understanding to their long-term memory
- teach a rich variety of scientific vocabulary that is built upon across the key stages

Intent:

At Hove Learning Federation it is our intention to recognise the importance of science in every aspect of daily life. We strongly believe that all children should be learning scientific knowledge, content and an understanding of our world alongside active investigations and enquiry-based learning. They should be encouraged to discuss and debate the 'big ideas' of science and through this discussion ask and answer questions about the world around them. Our curriculum overview ensures children are exposed to the facts and theories set out in The National Curriculum (2014) and The Development Matters Curriculum (2020) giving them a progression of knowledge and skills that builds from year to year. However, it is the understanding and investigation of key ideas that allows children to further explore events and phenomena that influence their lives.

Our goal is that science units allow children to learn through enquiry. Starting with their initial questions that will be based on their existing ideas and experience, we encourage children to make predictions, explore concepts through investigation, collect data and return to their original idea to reflect and pose further questions. This cycle develops throughout the children's primary school journey and a clear progression of skills is taught to enable them to become scientific thinkers. Each science unit of learning is planned to ensure progression across and within year groups as children build on their previous skills and knowledge.

Our aim is that children will develop a life-long interest in science and their world. Our curriculum is thoughtfully planned to

- engage, inspire, motivate, support and challenge
- ensure our learners progress academically and become more expert as they progress through the curriculum
- develop as successful, informed, engaged, thoughtful, confident learners, who make a positive contribution to the community and society – both now and in the future

Our Values & Curriculum Drivers At Hove Learning Federation, science is driven by the following values:		
	**Love of Learning**	• Enjoy immersive learning opportunities that aim for children to explore and discover the world scientifically. • Inspire children's curiosity and understanding about their world, allowing them to gain a better knowledge of how and why things function through the different strands of biology, chemistry and physics. • Develop children's secure understanding of the skills of working scientifically. • Develop children's skills of enquiry through the planning of different types of investigation, that allows them to hone their skills of asking questions, making predictions, setting up tests, observing and measuring and recording data. • Encourage children's ability to evaluate and reflect on results, in order to become critical thinkers who can problem solve and ask further questions to find solutions. • Promote curiosity and a love of learning through activities that develop communication and collaborative skills through practical experimentation and research. • Encourage thinking about how past scientific discoveries influence the present.
	**Equality & Inclusion**	• Support children to be responsible global citizens of the future who look for and find solutions to the issues facing theirs and future generations. • Enable children from all backgrounds to feel connected to and understand the world around them. • Foster a sense of identity and an increased understanding of children's own position in their community and the world. • Help children to learn to value their own and other people's cultures, ideas, beliefs and perspectives on our world and consider the importance of science alongside these. • Through teaching, explore the diversity of the world of science. Allow children to understand that they are all scientists and all have the potential to develop in their science journey.
	**Aiming High**	• Explore their answers to big questions of science. • Be reflective and analytical when evaluating investigations and other sources of evidence. • Evaluate the effectiveness of evidence to develop reasoned interpretations. • Discuss the impact/legacy that science has had on today. • Inspire children to attain high standards by introducing purposefully chosen, diverse and aspirational scientific figures from past and present day.
	**Respect and Well-being**	• Foster empathy and respect for different perspectives and backgrounds. • Develop an understanding of themselves as citizens of the world.
	**Nurture and Citizenship**	• Develop a sense of curiosity through understanding and discovery. • Understand how discoveries in science affect their own community on a local, national and global scale.

WEST HOVE INFANT SCHOOL
A family of friends

Our Curriculum Design

Meet the needs of every child across the whole curriculum

Equity	Inclusion	Learning Behaviours	Personal Development	Skills	Knowledge and Understanding	Creative and critical thinking	Cultural Capital
Equality of opportunity. All children to succeed no matter their entry point.	Every child, whatever their individual abilities or needs, is equally valued.	Attitudes and attributes for learning and life.	Equip children to become global citizens, who live happy and healthy lives and know how to achieve their goals.	Curriculum mapped to include the subject specific skills required to attain and excel. Children develop learning to learn skills such as metacognition	Deep learning of the key concepts of our curriculum and the National Curriculum.	Both are nurtured. Children are challenged to question, reason and express themselves.	Is a golden thread, woven through everything we do to teach children well.

Learning Characteristics Animals

Underpinning Hove Learning Federation's curriculum are our learning characteristic's animals.

Independence	Perseverance	Curiosity	Imagination	Co-operation
				

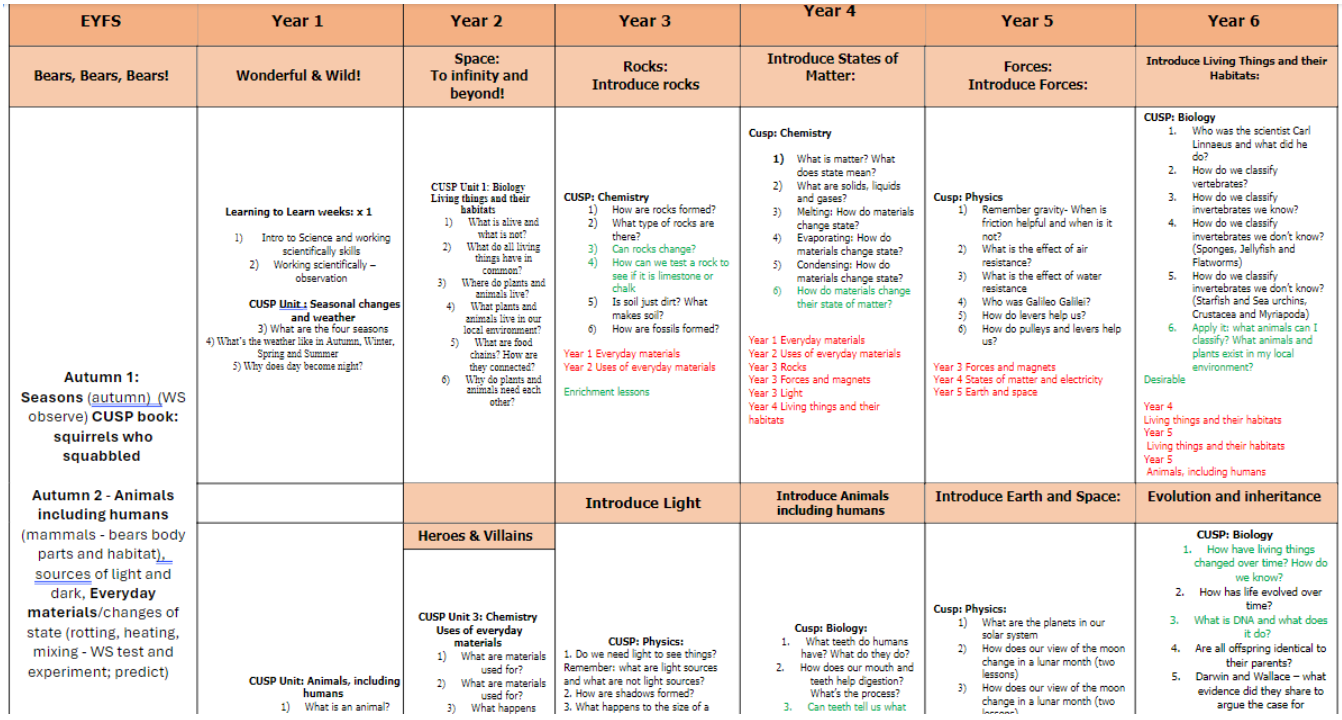
Science Long Term Sequence Features

Sequencing	Small Steps	Spiral	Long Term Memory	Making New Links	Cognitive Load	Key Concepts	Substantive and Disciplinary Knowledge
Our curriculum design deliberately sequences units of learning from EYFS to Year 6 to ensure children deepen their scientific knowledge and understanding through exposure to a progression of substantive and disciplinary knowledge	Learning is chunked into small steps that allow children to build knowledge and deepen understanding lesson to lesson, unit to unit and year to year.	The spiral design of our curriculum means children will return to key learning points and concepts. For example, in KS1 our sequence guides children to develop their knowledge of what an animal is, identifying and grouping animals	The progression of knowledge in science has been clearly mapped across each year group to ensure children will transfer new learning to long term memory. The ultimate goal is to make the learning stick!	The acquisition of knowledge into long term memory means that children are able to make links with new learning more easily. Our curriculum overview shows how new learning is carefully imparted over time.	Our long-term sequence for science reduces cognitive load by mapping out opportunities for children to review previous years and units learning. All staff are aware of the units and lessons covered in previous years in order to refer back.	Children develop knowledge about key concepts in science which allows them to draw contrasts, analyse trends and create their own structured accounts.	**Substantive Knowledge** The subject knowledge and explicit vocabulary used to learn about the content **Disciplinary Knowledge** The knowledge about how scientists investigate and use 'working like a scientist skills' of questioning,

		which will underpin their understanding of nutrition that animals need through to knowing and explaining 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.					observing, identifying classifying, testing and gathering and recording. It is through disciplinary knowledge that children become able to think like a scientist.

Science Long Term Plan

Our curriculum starts in EYFS and ends in Y6. Our long-term plans include the unit, concept question, substantive concepts and small step, lesson by lesson progression.



EYFS	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Bears, Bears, Bears!	**Wonderful & Wild!**	**Space: To infinity and beyond!**	**Rocks: Introduce rocks**	**Introduce States of Matter:**	**Forces: Introduce Forces:**	**Introduce Living Things and their Habitats:**
Autumn 1: Seasons (autumn) (WS observe) **CUSP book: squirrels who squabbled** **Autumn 2 - Animals including humans** (mammals - bears body parts and habitat), sources of light and dark, **Everyday materials**/changes of state (rotting, heating, mixing - WS test and experiment; predict)	**Learning to Learn weeks: x 1** 1) Intro to Science and working scientifically skills 2) Working scientifically – observation **CUSP Unit : Seasonal changes and weather** 3) What are the four seasons 4) What's the weather like in Autumn, Winter, Spring and Summer 5) Why does day become night? **CUSP Unit: Animals, including humans** 1) What is an animal?	**CUSP Unit 1: Biology Living things and their habitats** 1) What is alive and what is not? 2) What do all living things have in common? 3) Where do plants and animals live? 4) What plants and animals live in our local environment? 5) What are food chains? How are they connected? 6) Why do plants and animals need each other? **Heroes & Villains** **CUSP Unit 3: Chemistry Uses of everyday materials** 1) What are materials used for? 2) What are materials used for? 3) What happens	**CUSP: Chemistry** 1) How are rocks formed? 2) What type of rocks are there? 3) Can rocks change? 4) How can we test a rock to see if it is limestone or chalk 5) Is soil just dirt? What makes soil? 6) How are fossils formed? Year 1 Everyday materials Year 2 Uses of everyday materials Enrichment lessons **Introduce Light** **CUSP: Physics:** 1. Do we need light to see things? Remember: what are light sources and what are not light sources? 2. How are shadows formed? 3. What happens to the size of a	**Cusp: Chemistry** 1) What is matter? What does state mean? 2) What are solids, liquids and gases? 3) Melting: How do materials change state? 4) Evaporating: How do materials change state? 5) Condensing: How do materials change state? 6) How do materials change their state of matter? Year 1 Everyday materials Year 2 Uses of everyday materials Year 3 Rocks Year 3 Forces and magnets Year 3 Light Year 4 Living things and their habitats **Introduce Animals including humans** **Cusp: Biology:** 1. What teeth do humans have? What do they do? 2. How does our mouth and teeth help digestion? What's the process? 3. Can teeth tell us what	**Cusp: Physics** 1) Remember gravity- When is friction helpful and when is it not? 2) What is the effect of air resistance? 3) What is the effect of water resistance 4) Who was Galileo Galilei? 5) How do levers help us? 6) How do pulleys and levers help us? Year 3 Forces and magnets Year 4 States of matter and electricity Year 5 Earth and space **Introduce Earth and Space:** **Cusp: Physics:** 1) What are the planets in our solar system 2) How does our view of the moon change in a lunar month (two lessons) 3) How does our view of the moon change in a lunar month (two	**CUSP: Biology** 1. Who was the scientist Carl Linnaeus and what did he do? 2. How do we classify vertebrates? 3. How do we classify invertebrates we know? 4. How do we classify invertebrates we don't know? (Sponges, Jellyfish and Flatworms) 5. How do we classify invertebrates we don't know? (Starfish and Sea urchins, Crustacea and Myriapoda) 6. Apply it: what animals can I classify? What animals and plants exist in my local environment? Desirable Year 4 Living things and their habitats Year 5 Living things and their habitats Year 5 Animals, including humans **Evolution and inheritance** **CUSP: Biology** 1. How have living things changed over time? How do we know? 2. How has life evolved over time? 3. What is DNA and what does it do? 4. Are all offspring identical to their parents? 5. Darwin and Wallace – what evidence did they share to argue the case for

Science Subject Progression Ladder

Our Subject Leads created our Subject Progression Ladders to ensure the National Curriculum is taught step by step. They illustrate the progression of skills, knowledge and vocabulary taught through EYFS, Key Stage 1 and Key Stage 2.
Breaking down the National Curriculum objectives allows our teachers to plan for progression and provide all of our learners with the small steps they need. Identifying knowledge and skill progression in this way enables our teachers to plan an ambitious and effective spiral curriculum through the key stages which results in long term learning.
Subject and Year Leads use the Subject Progression Ladders to design and plan assessments and for monitoring.
They illustrate the progression of skills, knowledge and vocabulary taught through EYFS, Key Stage 1 and Key Stage 2.

	Year R (The Natural World, Managing Self)		Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
	Nursery	Reception						
	By the end of Reception, children: • Explore the natural world around them, making observations and drawing pictures of animals and plants (ELG) • 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 (ELG) • Understand some important processes and changes in the natural world around them, including the seasons and changing states of matter (ELG) • Manage their own basic hygiene and personal needs, including dressing and going to the toilet, and understand the importance of healthy food choices (ELG)		**By the end of Year 2:** Children should be taught to use the following practical scientific methods, processes and skills through the teaching of the programme of study content below: • 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		**By the end of Year 4, children:** • **Plan:** Ask relevant questions and use different types of scientific enquiries to answer them. • **Do:** Set up simple practical enquiries, comparative and fair tests. • **Record:** Make systematic and careful observations and, where appropriate, take accurate measurements using standard units, use a range of equipment, including thermometers and data loggers • **Review:** 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		**By the end of Year 6, children:** • **Plan:** Plan different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary • **Do:** carry out fair tests, recognising and controlling variables: deciding what observations or measurements to make over time and for how long; looking for patterns and relationships • **Record:** Take 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 • **Review:** Reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of - and degree of trust in - results, in oral and written forms • Identifying scientific evidence that has been used to support or refute ideas or arguments	
Working Scientifically	Uses all his/her senses in hands-on exploration of natural materials Talk about what they see, using a wide vocabulary. Explore how things work	Explore the natural world around them, making observations and drawing pictures of animals and plants (ELG) Describe what they see, hear and feel whilst outside. Explores the natural world around him/her **Autumn 1 –** **Gummy Bears Experiment** **Light and Dark Experiment** **Outdoor learning – Leaf parcels** **Outdoor learning – Spider Hunt** **Autumn 2 –** **Bears – similarities and differences** **Panda research** **Rotting apple experiment** **Porridge Making – Heat, senses.** **Outdoor learning – Porridge, change of state.** **More or less water.** **Outdoor learning – Herb tea, senses** **Spring 1 –** **Outdoor learning – Ice melting observations,**	To begin to ask simple questions and recognise that they can be answered in different ways *-explore the world around them, leading them to ask some simple scientific questions about how and why things happen;* **Termly Science Days** **Flip slide in every Science Session across the year**	Ask simple questions and recognise that they can be answered in different ways *including use of scientific language from the national curriculum* *-ask people questions and use simple secondary sources to find answers;* **Half termly Science Day** **Flip slide in every Science Session across the year**	**PLAN:** Ask relevant questions and use different types of scientific enquiries to answer them *-The children consider their prior knowledge when asking questions.* *-They independently use a range of question stems. - Where appropriate, they answer these questions.* *-The children answer questions posed by the teacher.* *-Given a range of resources, the children decide for themselves how to gather evidence to answer the question.* **Weekly science lessons**	**PLAN:** Ask relevant questions and use different types of scientific enquiries to answer them *-The children consider their prior knowledge when asking questions.* *-They independently use a range of question stems. Where appropriate, they answer these questions.* *-The children answer questions posed by the teacher.* *-Given a range of resources, the children decide for themselves how to gather evidence to answer the question.* *-They recognise when secondary sources can be used to answer questions that cannot be answered through practical work.* *-They identify the type of enquiry that they have chosen to answer their question.* **Weekly science lessons**	**PLAN:** Plan different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary *-The children independently ask scientific questions. - Given a wide range of resources, the children decide for themselves how to gather evidence to answer a scientific question. They choose a type of enquiry to carry out. They recognise how secondary sources can be used to answer questions that cannot be answered through practical work* *- The children select from a range of practical resources to gather evidence to answer their questions. They carry out fair tests, recognising and controlling variables. They decide what observations or measurements to make over time. They look for patterns and relationships.* **Weekly science lessons**	**PLAN:** Plan different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary *Children independently ask scientific questions. This may be stimulated by a scientific experience or involve asking further questions based on their developed understanding following an enquiry.* *- Given a wide range of resources, the children decide for themselves how to gather evidence to answer a scientific question. They choose a type of enquiry to carry out and justify their choice. They recognise how secondary sources can be used to answer questions that cannot be answered through practical work.* *-The children select from a range of practical resources to gather evidence to answer their questions. They carry out fair tests, recognising and*

Our curriculum is sequenced in line with the EYFS Statutory Framework (2021), Development Matters (2021) and the National Curriculum for Science (2015).

<u>Why do we have a long-term sequence? What is its purpose?</u>

- It is our intention for children to deepen their scientific knowledge and understanding over time through thoughtfully sequenced exposure to a progression of substantive and disciplinary knowledge.
- Our spiral curriculum is designed on the principles of instruction and is influenced by our understanding of how the memory works and cognitive load theory.
- Research shows that this will ensure knowledge is transferred to long term memory and making links with new learning is more accessible.

EYFS:

In Early Years our children are guided through opportunities to begin to recognise how to manage their self and own basic needs, whilst exploring the natural world. This includes making observations and drawing pictures of animals and plants. Children also gain an understanding of some important processes and changes in the natural world around them, including seasons and changing states of matter.

KS1:

The sequence in KS1 guides children to develop a sense of how scientists use their working like a scientist skills to develop knowledge of key concepts over time.

It begins with children being introduced to the subject of 'science and working like a scientist' enabling children to connect with the experiences and opportunities they were exposed to in EYFS while being introduced to the 5 key working like a scientist skills. Children then build on their knowledge of seasonal changes and weather enabling children to be directly involved in their school environment, knowing and explaining the order of seasons and changes within each season including months of the year; knowing different patterns of weather and explaining, for example, how rain can occur in all seasons; building on their substantial knowledge and exposing them to practical experiments that explore knowing that the earth rotates and explaining how day and night occurs.

Children develop an early conceptual understanding of how day becomes night. An understanding of change over time connects to the study of 'plants, including trees'. This focus enables children to associate trees as belonging to the plant kingdom and notice the changes deciduous trees go through connected to the seasons. Contrasting that study, pupils learn about 'animals,

including humans'. Non-examples of plants are used to contrast the features of an animal. Pupils are introduced to identifying and classifying materials. Scientific terms, such as transparent, translucent and opaque are taught explicitly through vocabulary instruction and pupils make further sense by applying it to what they know and then to working and thinking scientifically tasks. This substantive knowledge is enriched by pupils' use of disciplinary knowledge through scientific enquiry. To deepen their understanding, Year 1 pupils revisit the study of 'animals, including humans' as a retrieval module and deepen their knowledge through revisiting and thinking hard through increasingly challenging tasks. As pupils progress through KS1, new knowledge is integrated with pre-existing understanding. For example, in Year 2, the study of 'living things and their habitats' and 'uses of everyday materials', engages pupils to integrate and draw upon their knowledge of 'animals, including humans' as well as 'plants', and the study of Materials. New substantive knowledge is constructed and made sense of through 'Working and Thinking scientifically' tasks.

Children go on to develop an understanding of the concept of Biology, Physics and Chemistry through the topics of Animals including Humans, Plants and Everyday Materials.

In **biology** within **plants** they learn about:
Y1
-identifying the basic structure of plants and trees, such as roots, bulbs, stem, leaf, flower, fruits, trunk, branch and crown. --identifying the common names of wild and garden plants and knowing and identifying different trees in the locality, such as oak or beech, which develops into a deeper knowledge of knowing and explaining the difference between evergreen and deciduous trees, including the influence of season. This is further developed though a study of our locality and by knowing about local plant species.

Then moving onto deepening their early concept of **plants** by:
Y2
-knowing and explaining what conditions are needed for seeds to germinate and mature into plants
-knowing and explaining how bulbs grow
- knowing and explaining the conditions that plants need to thrive, grow, mature, and reproduce

Within **animals including humans** they learn about:
Y1
-knowing and explaining what an animal is and what a plant is
-knowing and explaining how seasons influence plants and animals
-knowing and identifying the common features of fish, amphibians, reptiles, birds and mammals
-knowing, explaining and grouping animals by the types of food they eat
-knowing and explaining the places (habitats) that fish, amphibians, reptiles, birds and mammals live
-knowing and locating the main body parts of a human
-knowing the five senses and explaining how they help compare different textures, sounds and smells

Then moving onto deepening their early concept of **animals including human** by:
Y2
-knowing and explaining that animals, including humans, have offspring which grow into adults
-knowing and explaining simple life cycles of animals, including humans
-knowing and explaining that animals need water, food and air to survive
-knowing and explaining that to be healthy, humans need to exercise, eat the right amounts of different types of food and keep clean

Y2 moving onto early concept of **living things and their habitats** by:
-knowing and explaining the common characteristic of living things, such as MRS GREN
-knowing and explaining the difference between things that are living, dead and things that have never been alive
-knowing and explaining what a habitat is and why plants and animals that live there are best suited to it
-knowing and identifying a variety of plants and animals in micro-habitats and habitats
-knowing and explaining what an animal is and how they get their food from other plants and animals
-knowing and explaining what a simple food chain is, including the direction of energy

In **chemistry** within **everyday materials** they learn about:
Y1
-knowing the properties of everyday materials, such as wood, plastic, glass, metal, water, and rock
-knowing and explaining the difference between an object and the material from which it is made, such as metal and a spoon
-knowing and explaining the properties of materials, such as hard / soft, stretchy, / stiff, rough / smooth, bendy / rigid, waterproof /not waterproof, absorbent / not absorbent, opaque / translucent / transparent

-knowing, explaining and grouping a range of everyday materials depending on their properties
This is further developed though topic based learning and practical use of materials to create a final piece

Then moving onto deepening their early concept of **everyday materials** by:
Y2
-knowing and explaining what properties everyday materials have
-knowing, comparing and explaining the properties and suitability of everyday materials for particular uses, such as glass in windows or bricks for building – identifying what is suitable or unsuitable
-knowing and explaining how the shape of everyday materials can be changed, for example by squashing, bending, twisting and stretching
-explaining how significant scientists have made useful things from knowing about the properties of materials, such as Charles Macintosh

In **physics** within **Seasonal changes and daily weather** they learn about:
Y1
-knowing and explaining the order of seasons
-knowing and explaining the changes within each season including months of the year
-knowing different patterns of weather and explaining, for example, how rain can occur in all seasons
-knowing that the earth rotates and explaining how day and night occurs

Lower KS2:

In lower KS2, our children continue to learn how to work scientifically, developing skills in asking relevant questions, set up simple practical enquiries, make systematic and careful operations, report on their findings from their enquiries, using results to draw simple conclusions leading to further questions and predictions, use age-appropriate scientific evidence to answer questions or to support their findings. The scientific knowledge and conceptual understanding are developed through the subject strands of biology, chemistry and physics. Through explicit vocabulary instruction and experimentation, children are able to draw upon prior understanding to support and position new knowledge enabling the stable construction of long-term memories.

In **biology**, lessons explore animals including humans and living things. Within this, children learn about animals' (including humans) nutrition and that they get nutrition from what they eat. Children learn that humans and some animals have skeletons and muscles for support, protection and movement. They also learn about the digestive system in humans including teeth. They construct and interpret food chains identifying producers, predators and prey. When learning about living things children recognise that they can be grouped in a variety of ways. They explore and use classification keys. They also recognise that environments can change and that this can sometimes pose dangers to living things.

Within plants, children identify and describe the functions of different parts of flowering plants. They explore the requirements of plants for life and growth and how they vary from plant to plant. Children explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal. Through experimentation they investigate the way in which water is transported within plants.

In **chemistry**, children learn about the three different types of rocks and begin to compare and group them based upon their physical properties. In simple terms children describe how fossils are formed and explore different types. They also discover that soil is made from rocks and organic matter. In year 4, children compare and group materials together, according to whether they are solids, liquids or gases. Through investigation, they will observe that some materials change state when they are heated or cooled. Using what they have learnt, children will identify the part played by evaporation and condensation in the water cycle.

In **physics**, children learn about the forces of push and pull. They compare how things move on different surfaces. They notice that some forces need contact between two objects, but magnetic forces can act at a distance. They will observe how magnets attract or repel each other and learn that magnets have two poles. With help, they will design experiments to investigate how some materials, but not all, are attracted to magnets. Then compare and group these accordingly.

In the topic of light, children learn that they need light in order to see things and that dark is the absence of light. They will notice that light is reflected from surfaces and that shadows are formed when the light from a light source is blocked by an opaque object. They will look for patterns in the shape and size of shadows and recognise that light from the sun can be dangerous and that there are ways to protect their eyes.

In electricity, children will identify common appliances that run on electricity. They will construct a simple series electrical circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers. They will investigate complete and incomplete circuits using their problem-solving skills. The children will learn through investigation which materials are conductions and which are insulators.

In year 4 children learn about sound. They learn that sound produces vibrations and that the vibrations travel from the source through a medium to reach our ears. They will discover that the sound causes the delicate parts of our inner ear to vibrate, and these vibrations are sent as messages to the brain. They will learn that sound waves can only travel through a medium such as gas, water or solids and cannot travel through a vacuum (Space for example). The children will explore making sounds on musical instruments and other household items and will learn that the volume of the sound depends on the size of the vibrations which decrease the further you are away from the source. They will also explore pitch and compare this to the size of the object that has made it and will investigate materials that insulate sound.

Upper KS2:
In upper KS2 children plan different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary They carry out fair tests, recognising and controlling variables: deciding what observations or measurements to make over time and for how long; looking for patterns and relationships They record their data by taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate. They use different methods to record their data using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs. They learn about presenting findings from enquiries by writing conclusions, identifying causal relationships and questioning the degree of trust in - results, in oral and written forms. Children in years 5 and 6 learn to identify scientific evidence that has been used to support or refute ideas or arguments.

In **biology**, children learn to describe the changes as humans develop to old age. They learn to identify and name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood. Linked with PSHE they recognise the impact of diet, exercise, drugs and lifestyle on the way their body's function. They describe the ways in which nutrients and water are transported within animals, including humans.

Lessons also explore the differences in the life cycles of a mammal, an amphibian, an insect and a bird and the children learn about the life process of reproduction in some plants and animals. They learn about 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. Children develop the skills to classify plants and animals based on specific characteristics and give reasons for their groupings.

In years 5 and 6 children learn about the concept of evolution and adaption. They recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago. They also learn that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents. The children discuss and identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution.

In **chemistry**, through collaborative activities children 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. Through experimentation, they learn that some materials will dissolve in liquid to form a solution and they learn how to recover a substance from a solution. Children use their knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating. Based on evidence from comparative and fair tests, the children learn how to give reasons for the particular uses of everyday materials, including metals, wood and plastic. They learn that dissolving, mixing and changes of state are reversible changes and that some changes result in the formation of new materials, and that this kind of change is not usually reversible.

In **physics**, lessons explore forces including gravity, resistance forces and mechanisms. The children learn that unsupported objects fall towards the Earth because of the force of gravity. Through experimentation they identify the effects of air resistance, water resistance and friction that act between moving surfaces. The children learn to recognise that some mechanisms, including levers, pulleys and gears, allow a smaller force to have a greater effect.

They also explore the topic of light. In upper KS2 children learn to that light travels in straight lines. They then use this concept to explain that objects are seen because they give out or reflect light into the eye. They also explore how this concept can help them to explain why shadows have the same shape as the objects that cast them.

Children revisit the topic of electricity to build upon skills from lower KS2. They learn to associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit. They learn to 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. · The children use recognised symbols when representing a simple circuit in a diagram.

Lessons also explore the Earth and beyond. In this topic children learn to describe the movement of the Earth, and other planets, relative to the Sun in the solar system. Through models they learn about the movement of the Moon relative to the Earth. They learn that the Sun, Earth and Moon are approximately spherical bodies. Children learn about how the Earth's rotation explains day and night and the apparent movement of the Sun across the sky.

Early Years Foundation Stage
In our reception classes, science is mainly taught through the 'Understanding the World' area of the EYFS, Development Matters curriculum. Initially introduced through activities that encourage children to observe, problem solve, explore, think, predict, make decisions and discuss the world around them, scientific understanding is stimulated with a wide range of practical activities. They will listen to sounds that are familiar in their local environment and will get the chance for enriching experiences within their local community such as nature walks that link to their science learning and build cultural capital. Children will learn about things that are natural and manmade and their different functions. They will also make observations of plants and animals and explain why some things occur and talk about changes. Children will be encouraged to ask questions about cause and effect and will engage in activities that prompt this enquiry. They will also be asked questions about what they think will happen in order for them to talk about, plan, investigate, record and evaluate findings. Other areas within the Foundational Stages of the National Curriculum include: Physical Development and Expressive Art and Design and within these strands children will observe and manipulate different materials to identify similarities and differences and explore using their senses.

Substantive Knowledge

This is the subject knowledge and explicit vocabulary used to learn about the content.

Golden Thread – 3D Curriculum
Curriculum Drivers & Substantive Concept Mapping

Our curriculum drivers (see above) and our science substantive concepts (see below) are the 'golden thread' running through our science curriculum.
Children learn abstract concepts through meaningful examples and repeated encounters in different contexts across the curriculum. This explicit planning supports children to transfer their knowledge across the curriculum and use it to frame future learning.
This supports our work towards a 3D curriculum that promotes remembering. Our 3D curriculum is designed so that knowledge is built upon term by term, year by year and between topics across a variety of year groups. This enables our children to gain and retain more knowledge and understanding.

Science 3D Curriculum		
Vertical Links	**Horizontal Links**	**Diagonal Links**
Concepts deliberately constructed within a subject that are encountered across year groups from EYFS to Y6 (for example when studying their Stone Age to Iron Age topic children learn about rock's and soils so that key vocabulary and knowledge is shared and linked.) ↕	Links between subjects, commonly known as cross-curricular, or themed (for example, properties of materials in Y1 science everyday materials unit and in Y2 DT moon buggy – designing and testing materials.) ↔	Concepts connected across both year groups and across subjects (for example, knowing and explaining the places (habitats) that fish, amphibians, reptiles, birds and mammals live in Y1 animals including humans unit and in Y2 writing unit focus – Walking through the Jungle.) ↗↙

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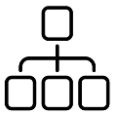
Science Substantive Concepts

Throughout their science learning at Hove Learning Federation children will be given the opportunity to explore the scientific concepts that are outlined below.

Organization 	Cause and effect 	Systems 	Scale 	Change 	Variation 	Diversity 
Scientists use classifying to organise natural phenomena. For example, in Year 3 rocks are classified into categories depending on the process that lead to their formation Reception children be introduced to this concept by sorting objects like leaves, shells, or rocks according to their characteristics.	Children are taught about the predictable patterns that can be found in nature. Scientists observe that effects cannot occur without causes. Year 2 children can learn about cause and effect by observing the effect that light, water, and warmth have on seeds and plants. Year 5 children learn that materials can be separated as a result of processes such as boiling and evaporating.	Children develop an understanding of the concept of systems in science when learning about: matter, energy, and information moving through a defined pathway. A system is a set of component parts arranged in an order according to a plan or design. Year 4 children learn about teeth and the digestive system. In the summer term, they learn about electricity in the home and what are the components of a simple series circuits and how to build one. This learning is returned to in Year 6 where they deepen their understanding of electricity and electric circuits.	By using rulers, thermometers, and a range of weighing devices, children understand that objects, forces and energy can vary in scale. For example in Year 5, children are asked to consider the scale and size of our universe, initially by comparing and representing the size of the Moon and Earth in relation to The Sun. The children use spherical objects of different sizes, e.g., a peppercorn, pea, football or beach ball and need to consider which object would present the best scale/illustration of the relationship of the Moon, Earth and Sun to each other in our solar system. After this, the children learn that 1, 300,000 Earths could fit inside the sun (with room to spare).	Change is constant in our world and can also be measurable when considered through a scientific lens. There are different rates of change and it can be had for children to understand change that is too slow to observe. However this concept is brought to life in units of work such as Year 5's Earth and Space unit where they look at the phases of the moon and in EYFS when children make porridge and playdough.	By learning about humans and other living things as well as inheritance and evolution, children explore the concept of variation. Our children leave year 6 with the knowledge that all organisms and objects have distinctive properties and that these properties can vary continuously. In Year 6, children learn about Charles Darwin's study of finches on the Galapagos Islands. Darwin noted that although the finches were similar to those found on the mainland, each showed certain characteristics that helped them to gather more food easily in their specific habitat. The children then explore using different implements that work in a similar way to a bird's beak to see which is more or less successful at different tasks.	Diversity is a concept that is central to systems surviving in nature. When children explore adaptation and evolution they learn how organisms diversify and evolve to suit changing conditions. Starting in EYFS and Key Stage 1 when children explore mini-beasts to start to learn that different organisms feed on different things.

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Science Substantive Concept Mapping & Thinking Questions

Substantive concepts
Substantive concepts are taught through explicit vocabulary instruction as well as through the direct content and context of the study. Concepts link up through the school and are revisited in our spiral curriculum (see above).

Thinking Question
Each unit has its own thinking question which binds all of the lessons together. The teacher and children revisit the thinking question at the end of each lesson. As pupil knowledge develops over time, the children are able to build upon prior learning, make connections and answer the question in more depth.

KS1 Thinking Questions
In KS1 the thinking question is mind mapped by the whole class in the initial lesson of a unit and then added to with each subsequent lesson so that children can see how their accumulated knowledge enables them to form an answer.

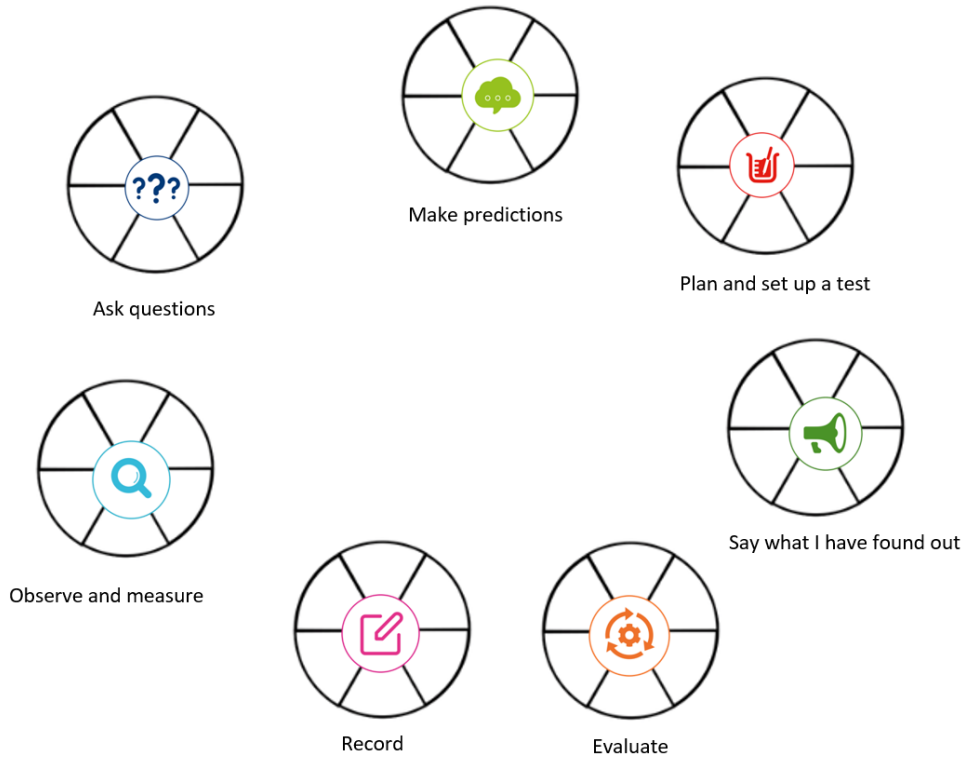
KS1 Examples	
Y1	What types of animals are there?
Y2	What do all animals need to stay alive?

KS2 Thinking Questions
In KS2 the thinking question is mind mapped in their books. Following teacher modelling, children can independently add to their mind-map as the unit progresses and answer the question as they choose in their end-of-unit double page spread.

KS2 Examples	
Y3	Do we need light to see things?
Y4	What animals are vertebrates?
Y5	What properties do materials have? How do we use them?
Y6	What is blood made of and why do we need it?

Disciplinary Knowledge – Thinking and working as a scientist

Disciplinary knowledge describes the varied types of ways of **working like a scientist** in order to develop knowledge and understanding of a variety of scientific concepts. It is the **skills** children use when being a scientist. Within our science curriculum, children will consider the following disciplinary knowledge when thinking and working scientifically.

Year Group: Working like a scientist	
UNIT Title and Picture	

Local Knowledge, Enrichment & Cultural Capital

Local knowledge and community

At HLF, we value the importance of our local community and locality. Within our curriculum our children learn about the flora and fauna of our local area, the impact of the seasons on our local area and specifically our school grounds and the importance of biodiversity.

Enrichment

We provide enrichment opportunities that can happen inside or outside of the school but that complement classroom instruction. The aim is for our children to try new and varied activities that help to develop character, resilience, and motivation, and that encourage our children to pursue their interests and become lifelong learners. We know that enrichment activities can empower children to develop skills, discover passions, and foster a well-rounded education.

Cultural Capital

These are the opportunities such as trips, visits, local walks and interactions with members of our local community that our woven through our curriculum that give children the essential knowledge needed to be educated citizens that have an appreciation of how human creativity and achievement in the past has, and continues to, influence our lives. However cultural capital is also derived from the practical, scientific learning opportunities in the classroom, the sources of inspiration for lessons carefully curated by our staff and the dialogue around scientific thinking that children are engaged with.

Visits, trips, and enrichment activities to show how children build upon their understanding of their community (Brighton and Hove)

YR	Y1	Y2	Y3	Y4	Y5	Y6
Understanding the world Saplings Local Area walks – exploring local flora and fauna, seasons	**Plants/ Animals including humans** Local walks looking at the local flora and fauna, plant life, biodiversity	**Plants/ Animals including humans/ Living things and their Habitats** Local walks looking at the local flora and	**Our City Our World Forces** Trip to Rampion Windfarm control centre	**Living things and their Habitats** Local park visit- invertebrate hunt using classification keys to identify findings.	**Forces** Enrichment activity through Ogden Trust Primary Group.	**Animals including humans** Secondary school visit to dissect hearts.

	School grounds – wildflower gardens, saplings area Woodsmill visit – animals including humans and plants focus	fauna, plant life, biodiversity School grounds – wildflower gardens, saplings area Drusilla's visit – Animals including humans and Living things and their habitats focus	**<u>Animals including humans</u>** **<u>Plants</u>** **<u>Rocks, fossils and soils</u>** Wild beach sessions			

Implementation – How do we deliver the curriculum?
-The strategies and steps that we take every day to achieve our curriculum intent

Sequencing

Our science curriculum builds on children's understanding of their world through the disciplines of biology, physics and chemistry. Each discipline is built on through our spiral curriculum from EYFS to Year 6. This enables our children to build a depth of knowledge, acquire and practice key skills and embed vocabulary. Each unit is strategically planned to build upon prior learning with opportunities to introduce and revisit key concepts woven throughout in order to deepen pupil understanding. An example of this is outlined below:

YR	Y1	Y2	Y3	Y4	Y5	Y6
Explore the natural world around them, making observations and drawing pictures of animals and plants.	Animals, including humans	Living things and their habitats Animals, including humans	Rocks fossils and soils Light, dark and shadows Forces and magnets Plants Animals including humans	States of Matter Sound Animals including humans Living things and their habitats Electricity	Living things and their habitats Animals including humans Properties and changes of materials Earth and space Forces	Living things and their habitats Animals including humans Evolution and inheritance Light Electricity
-Asking Questions -Observing Closely -Simple Test	-Asking Questions -Observing Closely -Identifying and Classifying -Gathering and Recording -Simple Test	-Asking Questions -Observing Closely -Identifying and Classifying -Gathering and Recording -Simple Test	-Asking questions -Making predictions - Setting up tests - Observing and measuring - Recording data -Evaluating	Asking questions -Making predictions - Setting up tests - Observing and measuring - Recording data -Evaluating -Interpreting and	Asking questions -Making predictions - Setting up tests - Observing and measuring - Recording data -Evaluating -Interpreting and	Asking questions -Making predictions - Setting up tests - Observing and measuring - Recording data -Evaluating -Interpreting and

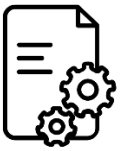
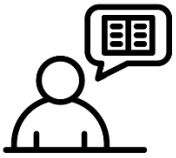
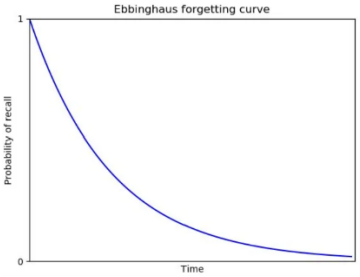
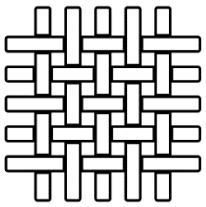
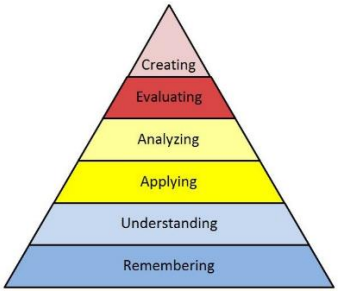
				communicating results	communicating results	communicating results	

Pedagogy
Key Principles for Effective Teaching & Learning at Hove Learning Federation

high expectations 	quality first and adaptive teaching 	developing learning behaviours 	relationships and environment 	quality of instruction 
inspire, support and challenge 	layered modelling to ensure access for all children 	subject knowledge and mastery 	effective questioning and feedback 	making it stick' - transferring knowledge to long-term memory 

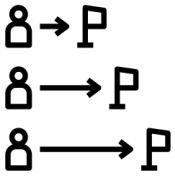
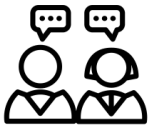
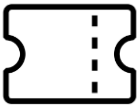
Key Theories & Evidence Based Research to design lessons and units

Below are the key theories and research that underpin our approach to pedagogy and guide our curriculum design. They are used to promote high quality teaching and used in staff CPD to develop strategies that ensure constancy of standards and pedagogical understanding.

Sweller's cognitive load theory 	**Rosenshine's principles of instruction** 	**Cain and Oakhill's vocabulary instruction** 	**Maslow's Hierarch of Needs** 
Fiorella and Mayer's generative learning practice 	**Ebbinghaus' forgetting curve** 	**Interleaving and Spacing** 	**Bloom's Taxonomy** 
Retrieval Practice 	**Bruner's Spiral Curriculum** 	**Pupil Book Study** 	**Education Endowment Foundation** 

Assessment

Assessment opportunities are continuous and form a key part of our teaching and learning.
Formative assessment opportunities are planned in throughout our lesson model (see examples below).
Summative assessment – opportunities are planned in at the end of units and the end of the year.

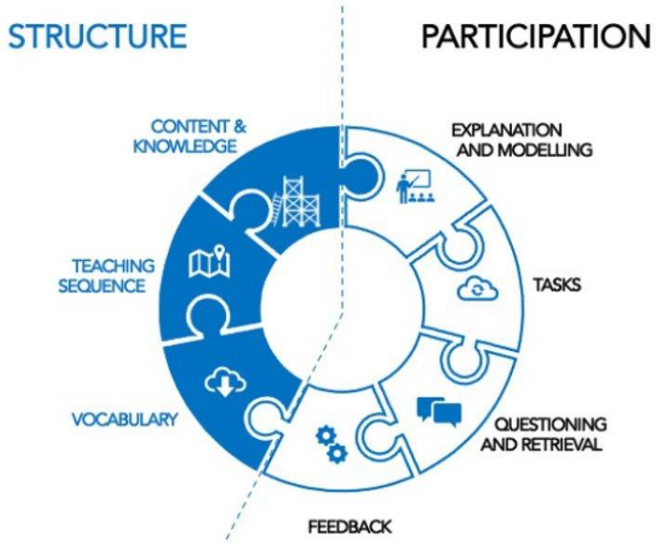
Examples of in class formative assessment opportunities				
deliberate practice and rephrasing of taught content 	cumulative quizzing within the learning sequence 	structured discussions in class 	retrieval and recall 	explaining and challenge partner talk 
self and peer assessment 	teacher feedback and summaries 	diagnostic questioning 	higher order thinking and exit tickets 	summarising and explaining the Big Question from the sequence 
rephrasing and thinking out loud 	key vocabulary use and application 	Professor Prove It 	Deep Diver and Submarine challenges 	lesson to lesson, unit to unit, term by term, end of year feedback & concept questions 

Mapping and Planning – 7 Lenses

Alex Bedford's Pupil Book Study approach to quality assuring the curriculum helps us to evaluate curriculum structures, teaching methods, pupil participation and response through a dialogic model.
When evaluating our curriculum design in this way, we ask the following key questions:

- How well do our children remember the content that they have been taught?
- Do books and children discussions radiate excellence?
- Does learning 'travel' with our children and can they deliberately reuse it in more sophisticated contexts?

To ensure our monitoring is thorough and targeted, we identify what is helping and hindering by looking at structure and participation (see table below).



Pupil Book Study 7 Lenses						
STRUCTURE			PARTICIPATION			
Content and Knowledge	Teaching Sequence	Vocabulary	Explanation and Modelling	Tasks	Questioning and Retrieval	Feedback

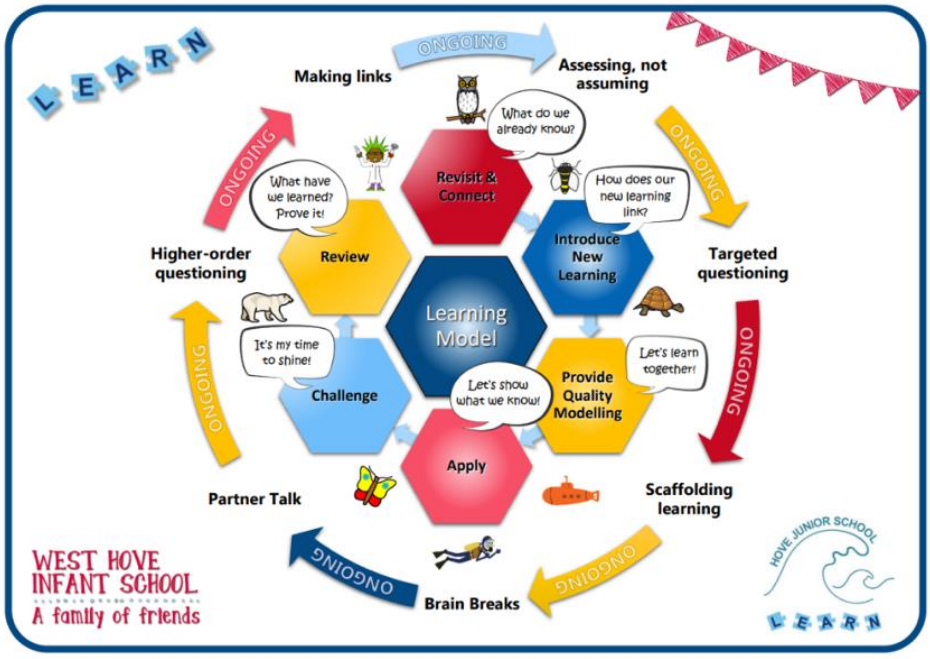
Learning Model

Learning Model: The Enacted Curriculum

To ensure constant quality-first teaching across the curriculum we have developed the Hove Learning Federation Learning Model. As illustrated in our visual guide below, each stage of the model has been carefully crafted on the most up to date evidence based research. It is a model designed to give enable all children to:

- Revisit prior learning from previous lessons and linked units from past terms and years.
- Make links with this learnt knowledge and new learning.
- Access new learning through skilled teacher modelling.
- Apply new understanding and skills with partner and independent work.
- Experience challenge at their level.
- Review the learning for that day and be guided to see how their understanding has deepened.

Teachers do not make assumptions about children's understanding but use a range of Assessment for Learning strategies to adjust lesson content and pace so that they are delivering the right knowledge and skills for the children they have in front of them. Learning is scaffolded to be inclusive to all and brain breaks and partner talk keep the learning engaging, accessible and challenging. Higher order questioning is used to guide children to make links and encourage considered thinking.
Staff receive regular CPD on each element of the Learning Model. Areas for development are pinpointed through monitoring and targeted for improvement.



Environment and Resources

We utilise a variety of high-quality images and diagrams within the teaching resources we provide for our children. These are carefully designed and dual coded to minimise cognitive overload and allow each child access to their learning in the most inclusive way. Wherever possible we use inspiring images, that can be zoomed in on to explain difficult concepts, and that spark discussion and challenge thinking. The use of all resources is modelled carefully by teachers so that every child knows how to succeed in each lesson.

Enrichment Opportunities

Our topic lead curriculum allows us to create learning sequences in science that ensure cultural capital and enrichment opportunities extend the curriculum offer for all pupils.

Topics:

- begin with a stunning start, an immersive day of activities to bring the topic to life for example Splish, Splash, Splosh in EYFS
- can includes a marvellous middle where children enjoy a topic related trip or visitor from school for example Year 3 go to the Rampion Windfarm Information Centre
- end with a fabulous finish in which parents are invited into school to celebrate the children's work across the term

These events can include:

- visits from experts e.g. YR: People who help us (emergency workers)
- dressing up days where children create themed accessories in class e.g. Science Days or World Book Day
- drama workshops - Y1 Plants drama
- visits of local areas with Science focus e.g. YR: Local Walks, KS1: Local walks and Beach visit, KS2: Wild beach school sessions
- trips further afield e.g. YR: Paradise Park, KS1: Woodsmill and Drusillas, KS2: Blacklands

Where possible we develop children's skills of enquiry through the investigation of:

- real artefacts e.g. YR: plants, animals, mould experiment, porridge KS1: Plants, bulbs, tree parts, materials, KS2: plants, bread experiment, investigation of the digestive system, rocks and soils, electric circuits, heart dissection
- online sources e.g. CUSP, Woodland Trust, Oak Academy, National Geographic
- pictures
- real life stories e.g. YR: Emergency worker visits and stories

Diversity and Identity across the Science Curriculum

Through our planning and curriculum mapping, we celebrate the diversity within our community and the wider world and develop confidence in individual identity through our tailored curriculum.

Children are introduced to a diverse range of scientists and scientific thinkers from throughout history to the present day. We also strive to give children as much access to adults from our local community who work in scientific fields by inviting them to come into school to talk in assemblies and class visits.

Some of the scientists children learn about are outlined below:

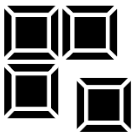
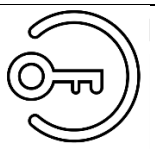
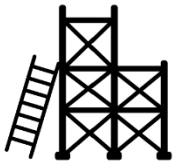
Key Stage 1: Barry Paw, Sarah Walker, Agnes Arber (female botanist), Nalini Nadkarni (female ecologist), Suzanne Simard, George Washington Carver – crop rotation

Key Stage 2: Mary Anning, Euclid, Carl Linnaeus

SEND & Inclusive Learning

We adapt the curriculum to meet the needs of all our children so that everyone can access the learning, build on their prior knowledge, and understand the skills needed to become historians.
We do this by:

	-Identifying the CRITICAL CORE CONTENT that pupils with SEND need to know and use.

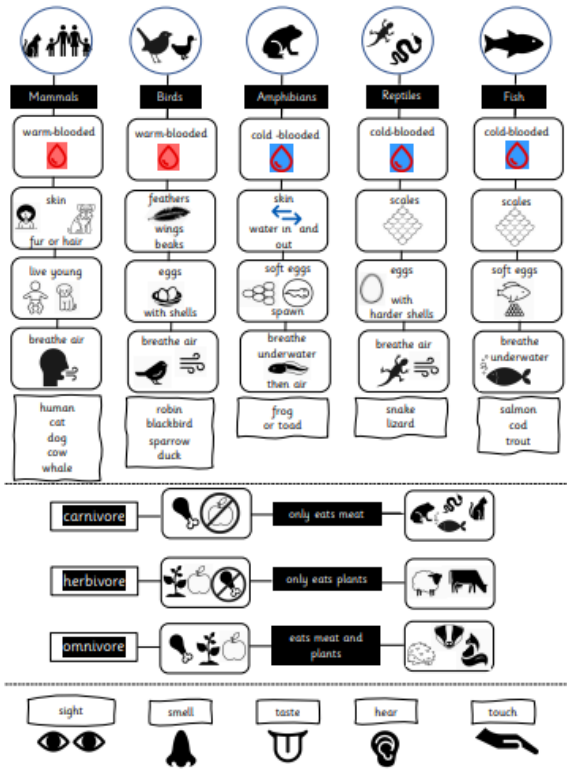
	
	-CHUNKING knowledge and knowledge notes/models in manageable sections
	-Teachers use structured RESPONSIVE FRAMEWORKS (including the use of stem sentences and sentence stems) to promote hard thinking
	-Teachers use structured DELIBERATE PRACTICE to increase attention and retention
	-Pupils with SEND are entitled to think hard. We use structured CHALLENGE FRAMEWORKS to promote hard thinking, drawing on the content, including explain the word connections and sequenced thinking paths
	· Dual coding (using CIP and symbols from the Noun Project) is used to pre-teach tier 2 and 3 vocabulary and is included on all lesson slides, core knowledge files and knowledge strips in Key Stage 2, and all activity sheets in Key Stage 1.
	· Higher level challenge partners and talking trios are used to ensure children with SEN and or EAL are provided with high quality talk and modelled language of history skills.
	· Activities ensure children with SEN or EAL can access tasks appropriately and share their understanding of historical concepts.
	· Differentiation and scaffolds are included where appropriate to enable access to learning and ensure children make at least expected progress.
	· Pictures and quotes are taken from children with SEN and or EAL to ensure evidence is recorded in books and on The Portal (EYFS)
	· EEF 5-A-Day approaches/strategies are reviewed and incorporated into our lessons 1 – explicit instruction, 2 – cognitive and metacognitive strategies, 3 – scaffolding, 4 – flexible grouping, 5 – using technology

Knowledge Organisers

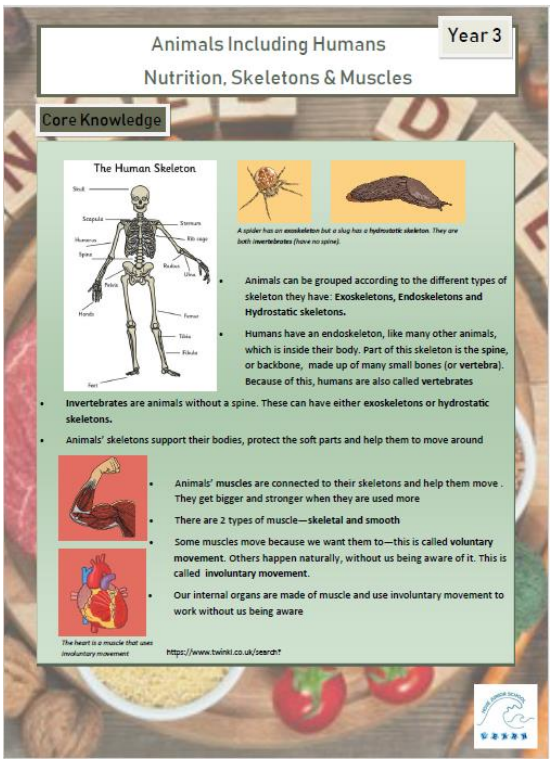
Knowledge organisers are used for each Science unit in KS1 and Core Knowledge Files in KS2 so that:

- Core knowledge can be conveyed in one place.
- Students and teachers can refer throughout.
- It can support questioning and retrieval.
- It can support participation.
- Key vocabulary can be highlighted.
- The split attention effect can be reduced.

Year 1 example

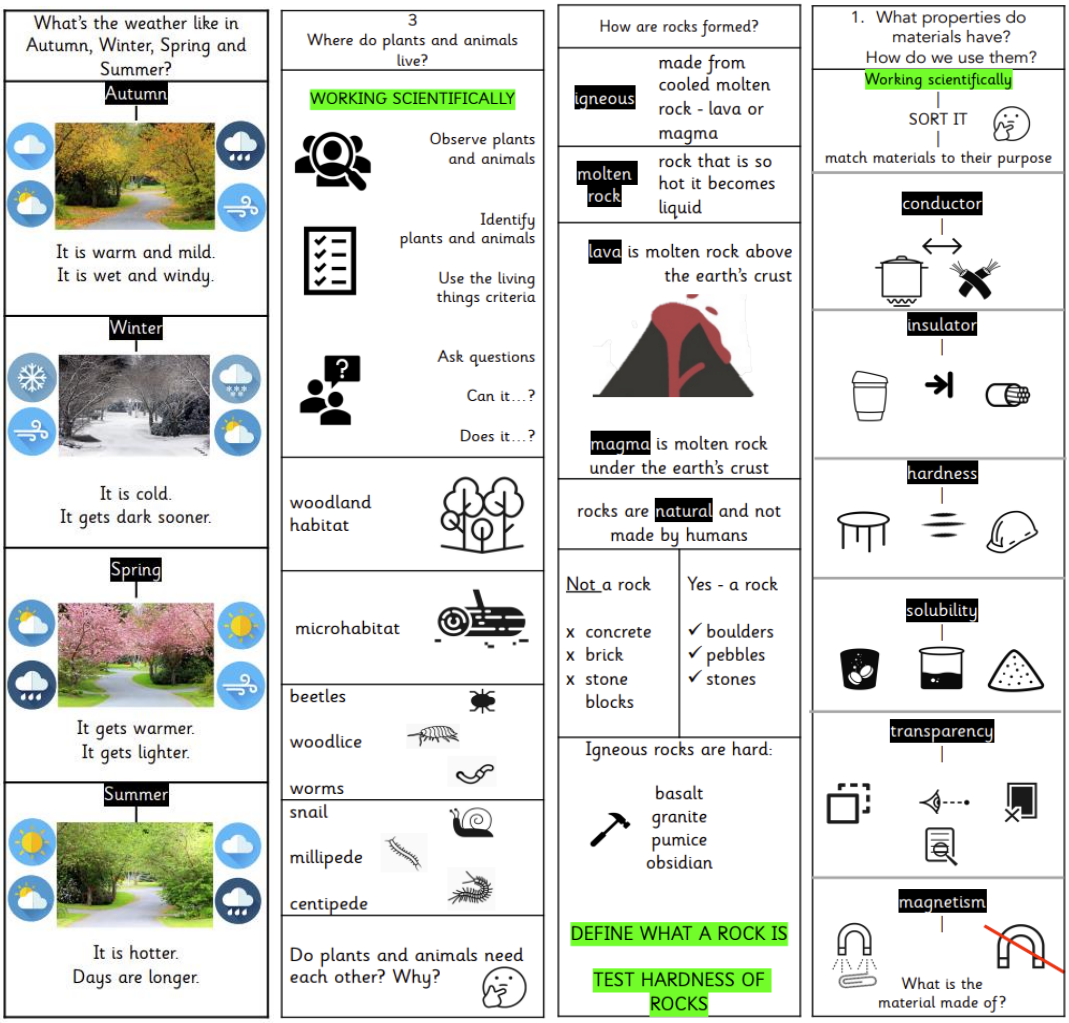


Year 3 example



Knowledge strips

- Knowledge strips are used during each KS1 and KS2 lesson to communicate key information. They are clearly articulated points of reference, showing the minimum expectation of study. You will see key knowledge and information, diagrams, dual coded vocabulary, tables and key questions.
- They start with a learning question that sets children off on their learning adventure. At the end of the lesson, every child responds to the question using what they have learned so far.
- Teachers edit and make adjustments to meet the needs of their children.



Year 1 Example **Year 2 Example** **Year 3 Example** **Year 5 Example**

Impact – How do we know our curriculum is effective? Evidencing the standards of Teaching and Learning

In order to identify the impact our curriculum is having on our pupils, we check the extent to which learning has become permanently embedded in children's long-term memory in addition to looking for excellence in their outcomes. At HLF, we use a number of tools to quality assure the implementation and impact of our curriculum such as:

- Pupil Book Studies (Subject Reviews & Shallow Splashes)
- Subject Meetings
- Subject analysis & Action plans
- Formative and Summative Assessment
- Learning observations/drop ins (subject lead, year/phase lead and SLT)
- CPD for all staff
- Governors
- Recent successes
- Next steps

Hove Learning Federation Impact

Children leave Hove Learning Federation as deeply knowledgeable and skilful learners who can set targets and believe in themselves to achieve them. They understand how to be socially, morally, spiritually and culturally responsible and aware. They are able to make positive contributions to the local and wider community and strive to be the best that they can be.

Learning Behaviours	**Emotional** 	Names and expresses emotions Manages impulses of personal behaviour	Shows price in successes	**Social** 	Focuses on learning in class Attentive to directions, listening to the teacher	Shows empathy and appreciates diversity	**Cognitive** 	Organises time and space for own learning Sets goals and monitors own progress	Talks purposefully with peers, valuing other opinions
Attitudes to Learning	Love of Learning and lifelong learners	Positive	Curious and Inquisitive	Independent	Able to work in teams	Motivated and Hardworking	Resilient	Proud	Ready for secondary school
Quality of Education	Evidence of learning	Attainment	Progress	Skills, knowledge and understanding	Personal Development	Relationships between pupils and staff	Learning atmosphere and environment	Professional Development	School Improvement

Pupil Book Studies – Subject Reviews & Shallow Splashes

At HLF, we have created our own monitoring systems that incorporate the key principles from the Pupil Book Study (see

Flip/PowerPoint and planning look 	• Planning for small steps • Progress and learning over time • Knowledge and skills based • Child centred, active learning • Consistency with the use of the HLF Learning Model across year groups and sites
Book Look 	• Shows progress of knowledge and skills • Shows development of learning and understanding • Demonstrates a clear sequence of learning • High expectations, consistency and pride in work
Pupil Voice 	• Use precise vocabulary • Show a deep understanding of the learning • Are enthusiastic about their learning • Talk through the learning sequence • Highlight how the learning builds lesson to lesson and unit to unit

'Implementation'). They are called Subject Reviews and Shallow Splashes. Through this form of monitoring, we quality assure each subject by carrying out:

1) Learning walks – subject teams and SLT support teaching and learning and record positives and good practice to share and inspire
2) Flip/PowerPoint and planning looks – to check planning & resources meet the needs of all of our learners. We check against our lesson model, Rosenshine's Principles of Instruction and the key theories & research that underpin our teaching philosophy
3) Book looks - to check for incremental small steps, sequencing, task design, scaffolds, personalisation, knowledge & skill progression, vocabulary, access, support & challenge
4) Pupil voice – to discuss the learning and see the subject through the eyes of the child. Part of our questioning is designed to assess the impact of our lessons, that they provide enjoyment, that children can articulate their learning with key vocabulary and that learning is 'sticking' in the children's long-term memory

Findings from our monitoring systems are categorised into positives and next steps. These can be specific to year group, to key stage or whole school (across the 3 sites). To ensure next steps are acted on, subject and year teams identify actions and assign responsibility. This monitoring feeds into our subject analysis and action plans (see 'Subject analysis and Action plans' below).

Subject Meetings

Subject team meetings are timetabled regularly throughout the year. Time is set aside during staff meetings, INSET days and yearly meetings with SLT. The aims of these meetings are to:

- Review current practise and impact
- Set targets, identify actions, and create plans
- Discuss the latest research and evidence to ensure our subjects are up to date and plans are in place to progress
- Work towards our school key priorities
- Give time to professional development and to offer support to our teachers

Subject analysis & Action plans

Each subject has an action plan for the academic year to monitor change and progress across a variety of objectives and goals within multiple areas (e.g., student, classroom, professional development, etc.). Using our school key priorities as a guide, our teams review and RAG their subjects throughout the year and set new targets each term. Each target is a story arc that shows how a subject leader has identified a next step, actioned it and reviewed the impact so that subject development is continuous and effective.
Each subject team uses the table below to reflect, plan, set actions, assess impact and discuss next steps.

What did you notice? (Why did you set this target?)	Action (What will you do?)	Intended Impact (What will this look like?)	Responsibility	By when	Evidence for Monitoring

Formative and Summative assessments

Our assessment structures are designed to ensure that our children will know more, remember more and be able to do more. A mixture of formative and summative assessments allows us to evaluate if our curriculum helps or hinders the goal of achieving persistent change in the long-term memory of our children.

Formative Assessment
We assess formatively throughout each lesson using our learning model (see 'Implementation' section). This tool ensures each lesson is planned and delivered to maximise assessment opportunities. Teachers use this information to support, challenge and adapt the learning.
Each subject assesses in a range of different ways (see 'Implementation' section).

Summative Assessment
Our curriculum is a progressive, spiral model. Teachers use deliberate summative assessment to measure if children are making progress as they journey through the curriculum. The range of summative assessment methods that teachers use build a picture of children's understanding of:

- Content and knowledge
- Use of vocabulary

- Ability to access the curriculum and thrive

All information gained from assessments are used to tailor, target and adapt future planning, teaching and learning.