Challenge, Equality & Opportunity

Science

Whole School Curriculum Intent:

We can build knowledge and skills	We are creative	We are resilient	We understand ourselves and each Other
 We strive for all of our children to have competency in the basic skills of reading, writing, maths and communication to underpin their learning, give them access to the broader curriculum and build their confidence as learners. We want our children to know more, remember more and be able to do more as a result of every learning experience across the curriculum.	We want our children to be creative in their thinking so that they use their knowledge and skills to solve problems and create new knowledge, skills, thoughts and objects which give them enjoyment and inspire them to take their learning further. 	 We need our children to develop independence and resilience so that they are able to grow as thinkers and learners.	We aim for our children to develop empathy, awareness, respect and tolerance in-keeping with the school's No Outsiders values. We also want all of our children to understand themselves and be ready for the next steps in their education and the wider world. 
What does this look like?			
Achieve well in reading, writing and communication, including being at the age related expectation in early reading and phonics. Can build on previous learning. Can access new learning experiences. Value and enjoy success in the core subjects. Choose reading and use reading effectively. Apply maths, reading, writing and communication across the curriculum.	Reflect, adapt and develop ideas. Explore concepts. Make links across the curriculum. Ask questions and are curious. Use initiative. Hypothesise and generate ideas Communicate learning. Direct own learning through range of skills. Can argue and use evidence.	Bounce back and try again. Try new things and take risks. Manage their own things, time and learning as appropriate. Engage with extra-curricular activities. Solve problems through perseverance. Work towards a goal.	Listen to others. Can work in a group and cooperate with others. Assess own success and learning. Take turns and are patient. Use manners and are polite in interactions with everyone. Can manage emotions and support others. Show respect. Are kind and begin to show compassion. Can follow the Golden Rules. Can express themselves.

Science Intent

We can build knowledge and skills

We provide a science curriculum that supports children to develop their scientific knowledge and conceptual understanding through the specific disciplines of biology, chemistry and physics as set out in the National Curriculum Science Programmes of Study.

We develop working scientifically skills alongside knowledge.

We learn to use a range of enquiry types: observing changes over time, noticing patterns, grouping and classifying, carrying out comparative or fair tests and researching using secondary resources and begin to suggest which enquiry type would best suit our Big Question.

We develop knowledge of what science looks like in 'real life' scenarios; through educational visits, meeting scientists and engineers and through research.

We are Creative

We build on pupils' curiosity and sense of awe and wonder of the natural world.

We extend the learning environment for our pupils, using our outdoor area and the locality.

Children discuss their scientific experiences and thinking in each lesson.

Children ask questions which are then investigated in lessons.

Each year we hold a GST STEM Week (Science, Technology, Engineering and Maths) and take part in British Science Week, where the whole school works collaboratively on a theme. Previous themes have included Growth, Our Diverse Planet and Journeys.

We are Resilient

Children ask questions and challenge their own ideas and thinking.

We are able to refine our work on the advice of others.

Many aspects of our science learning support the Eco-curriculum and work towards the Green Flag Award. We learn to look after our immediate environment and the planet and understand why this is important.

We do not only emphasise the positive effects of science on the world but also include problems, which some human activities can produce.

We Understand Ourselves and Each Other

We work collaboratively to develop our working scientifically skills, develop communication and critical thinking skills.

We give children the language, experience and knowledge to draw conclusions and to answer the Big Questions.

We enrich children's experiences by working with outside agencies and visitors in the science industry.

We raise aspirations the children and show that there are opportunities to use their learning in their future lives and careers.

We ensure that pupils realise the positive contribution of both men and women to science.

Science Implementation

We follow the National Curriculum Science Programmes of Study in Key Stage One and Two. Scientific knowledge and skills are taught progressively. Topics are designed to help learners to remember in the long term the content they have been taught and to integrate new knowledge into larger concepts. Each unit and lesson is framed around a Big Question which the children use their knowledge and learning experiences to answer.

Progression in Science

	R	Year 1	Year 2	Year 3	Year 4
Knowledge					
Plants	• Plant seeds and care for growing plants. • Understand the key features of the life cycle of a plant and an animal	• Identify and name a variety of common wild and garden plants, including deciduous and evergreen trees. • Identify and describe the basic structure of a variety of common flowering plants, including trees.	• Observe and describe how seeds and bulbs grow into mature plants. • Find out and describe how plants need water, light and a suitable temperature to grow and stay healthy.	• 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	
Living things and their habitats	• Explore the natural world around them. • Describe what they see, hear and feel whilst outside. • Recognise some environments that are different to the one in which they live.		• Explore and compare the differences between things that are living, dead, and things that have never been alive. • Identify that most living things live in habitats to which they are suited and describe how different habitats provide for the basic needs		• Recognise that living things can be grouped in a variety of ways. • Explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment. • Recognise that environments can change and that

			of different kinds of animals and plants, and how they depend on each other. • Identify and name a variety of plants and animals in their habitats, including microhabitats. • Describe how animals obtain their food from plants and other animals, using the idea of a simple food chain, and identify and name different sources of food.		this can sometimes pose dangers to living things
Animals, including humans	• Use all their senses in hands-on exploration of natural materials. • Begin to make sense of their own life-story and family's history. • Talk about members of their immediate family and community. • Name some common farm animals, minibeasts and sea creatures.	•Identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals. • Identify and name a variety of common animals that are carnivores, herbivores and omnivores. • Describe and compare the structure of a variety of common animals (fish, amphibians, reptiles, birds and mammals, including pets). • Identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense.	• Notice that animals, including humans, have offspring which grow into adults. • Find out about and describe the basic needs of animals, including humans, for survival (water, food and air). • Describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene.	• Identify 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.	• Describe the simple functions of the basic parts of the digestive system in humans. • Identify the different types of teeth in humans and their simple functions. • Construct and interpret a variety of food chains, identifying producers, predators and prey.

Seasonal Changes	• Explore the natural world around them. • Describe what they see, hear and feel whilst outside. • Understand the effect of changing seasons on the natural world around them.	• Observe changes across the four seasons. • Observe and describe weather associated with the seasons and how day length varies			
Materials **States of Matter (Y4)**	• Use all their senses in hands-on exploration of natural materials. • Explore collections of materials with similar and/or different properties. • Explore the natural world around them.	• Distinguish between an object and the material from which it is made. • Identify and name a variety of everyday materials, including wood, plastic, glass, metal, water, and rock. • Describe the simple physical properties of a variety of everyday materials. • Compare and group together a variety of everyday materials on the basis of their simple physical properties	• Identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses. • Find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching.		• Compare and group materials together, according to whether they are solids, liquids or gases. • Observe that some materials change state when they are heated or cooled, and measure or research the temperature at which this happens in degrees Celsius (°C). • Identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature. • Recognise some common conductors and insulators, and associate metals with being good conductors. (Y4 - Electricity)
Rocks		Materials	Materials Living Things and Their Habitats	• 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.	
Light		Day length and seasonal change		• Recognise that they need light in order to see things and that dark is the absence of light. • Notice that light is reflected from surfaces. • Recognise that light from the sun can be dangerous and that there are ways to protect their eyes. • Recognise that shadows are formed when the light from a light source is blocked by an opaque object. • Find patterns in the way that the size of shadows change.	
Forces and Magnets			• Find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching. (Y2 - Uses of everyday materials)	• Compare how things move on different surfaces. • Notice that some forces need contact between two objects, but magnetic forces can act at a distance. • Observe how magnets attract or repel each other and attract some materials and not others. • Compare and group together a variety of everyday materials on the basis of whether they are attracted to a magnet, and identify some magnetic materials. • Describe magnets as having two poles. • Predict whether	

				two magnets will attract or repel each other, depending on which poles are facing.	
Sound					•Identify how sounds are made, associating some of them with something vibrating. • Recognise that vibrations from sounds travel through a medium to the ear. • Find patterns between the pitch of a sound and features of the object that produced it. • Find patterns between the volume of a sound and the strength of the vibrations that produced it. • Recognise that sounds get fainter as the distance from the sound source increases.
Electricity					• Identify common appliances that run on electricity. • Construct a simple series electrical circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers. • Identify whether or not a lamp will light in a simple series circuit, based on whether or not the lamp is part of a complete loop with a battery. • Recognise that a switch opens and closes a circuit and associate this with whether or not a

					lamp lights in a simple series circuit. • Recognise some common conductors and insulators, and associate metals with being good conductors.
Skills Working Scientifically					
In Years 1 & 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				
In Years 3 & 4	•Asking relevant questions and using different types of scientific enquires 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 support their findings				
Language					
Plants		Plant, wild plant, garden plant, deciduous tree, evergreen tree, coniferous Some common flowering plants Flowers, vegetables Leaf/leaves flower, blossom, petal, stem, trunk, branch, root, seed, bud Leaf fall	Bulb growth, grow, habitat Local environment Water, light, temperature, healthy growth Survive Soil Germinate Stages of growth	Functions Nutrients, nutrition air Transport (water) Life cycle Pollination seed formation seed dispersal reproduce fertiliser	
Living things and their habitats			Pond, garden, field, park, woodland, sea shore, river, ocean, forest, rainforest,		Environment non-flowering plants Ferns, mosses

			Stones, rocks, logs, leaf litter, Habitat, micro-habitat Living, dead, not living, alive, Healthy Food, food chain, depend, source of food, Shelter Grow, growth, healthy nature reserve		Flowering plants grasses Vertebrate animals: fish, birds, mammals, amphibians, reptiles Invertebrate animals: snails, worms, slugs, spiders, insects, human impact – litter, deforestation, population increase
Animals, including humans	Names of common farm animals Names of common minibeasts Names of some sea creatures Names of body parts	Names of common animals: fish, amphibians, reptiles, birds, mammals Carnivore, herbivore, omnivore Human body Senses: see, hear, touch, taste, smell Body parts: head, neck, body, arms, legs, ears, eyes, nose, mouth, tongue, hands, feet, fingers, toes, elbows, knees, hair, teeth Pet, tame, wild animal, Insect Nocturnal	Habitat Local environment Food, eat, grow healthy Offspring Adults, young, Water, air, survive, exercise, hygiene, Egg, chick, chicken Caterpillar, pupa, moth, butterfly, tadpole, frog, frog spawn Lamb, calf, foal	Nutrition diet skeleton muscles protection, support, movement, bones, skull, shell joint pelvis rib cage spine	Digestive system Stomach Small intestine Large intestine Oesophagus Types of teeth: molar, pre-molar, incisor, canine, saliva
Seasonal change		Seasons Seasonal change Spring, summer, autumn, winter, Weather, sun, sunshine, rain, snow, sleet, ice, fog, cloud, hot, cold, storm, sky Thermometer			

		Earth day, night			
Materials **States of Matter (Y4)**		Everyday materials wood paper plastic metal glass water rock brick stone fabric material foil elastic dough rubber card cardboard clay object make/made Properties hard/soft shiny/dull stretchy/stiff rough/smooth bendy/not bendy waterproof/not waterproof transparent/opaque absorbent/not absorbent	Suitability Squash, twist, bend, stretch		Solid Liquid Gas Temperature Heat/ Heating Cool/ Cooling Water Cycle Evaporation, condensation, melting, freezing
Rocks				Rock Soil Fossil organic matter grains crystals sedimentary rock metamorphic igneous	
Electricity					Electricity Simple circuit Light bulb Cell, wire, buzzer, switch, motor, battery Series circuit Conductor/insulator
Sound					Sound Vibration, vibrate Pitch Volume Insulation

					Outer, middle, inner ear Cochlea Frequency auditory
Light				Light, dark Absence of light Reflect Shadow Opaque Mirror Reflective surface	
Forces and Magnets				Move, movement, surfaces Forces Push, pull Contact, distance Magnet, bar magnet, ring magnet, horseshoe magnet Attract, repel, poles (of magnets) Magnetic materials	
Working Scientifically		Experience, observe changes, patterns grouping sorting classifying compare identify (name) data measure record equipment questions test investigate explore magnifying glass / hand lens same different		develop enquiry practical enquiry fair test comparative test relationships conclusion accurate thermometer data logger estimate data diagram key (identifying) table chart bar chart results predictions explanation reason similarity difference question evidence information findings criteria values properties characteristics	

Delivery:

Science is taught as part of the continuous provision and as discrete lessons in Reception.

Our Science curriculum is progressive. In KS1 and 2, there are four or five topics for each year group. Coverage is planned to allow for consolidation and the recapping of prior knowledge before extending knowledge, skills and vocabulary. Each unit consists of 5 lessons which are usually taught discretely. Each unit and lesson is framed around a Big Question which the children use their knowledge and learning experiences to answer.

Working scientifically skills are developed across a Key Stage. Children in Year One would have closer guidance and support from the teacher to select a way of working and to carry out an investigation. The children would apply these skills with greater independence in Year 2. This is the same pattern for children in Years 3 and 4.

Lessons take place indoors and outdoors - making use of the school's environment and our close proximity to the Havannah Nature Reserve and Brunton Wetlands.

When appropriate, Science lessons support the application of skills taught in Maths lessons and we provide opportunities for children to demonstrate their developing scientific knowledge in English lessons, in their non-fiction writing.

A Typical Science Lesson at Havannah First School

Each KS1 and 2 lesson typically follows the following format:

1. Fast recall knowledge and retrieving key vocabulary. This may take the form of an observational task or quiz. Children will look at a photograph or short video clip and there will be discussion around what can be seen. Children will be encouraged to use their developing scientific vocabulary in these discussions.
2. Setting an investigative question which will be the focus of the lesson, establishing that the question will be answered by completing the learning activities undertaken in the lesson.
3. Introduction to the scientific knowledge and skills in the context of the question being investigated during this lesson. (This may involve use of video or teacher-led input.)
4. Children practising and exploring as they apply and further develop their knowledge and skills in order to formulate an answer to the investigative question.
5. Evaluation of learning and formulation of an answer to the investigative question set at the beginning of the lesson.

Lesson structures can vary to suit the content and the objective.

Science books will keep an ongoing record of children's learning and progress. Children will be encouraged to look back at their own prior learning and recall their learning, being encouraged to use scientific vocabulary.

Vocabulary is built upon and used in each lesson.

Children will work both indoors and outdoors. Time spent learning outdoors will vary by topic.

Children will take part in a science-related educational visit at least once in KS1 and in KS2. There will also be visitors into school to support the children's learning in each Key Stage.

Sources of support, information and guidance

For Staff CPD www.reachoutcpd.com

Staff can access 20 minute modules to refresh and update subject knowledge ahead of planning and delivering a topic area. Useful resources can be saved and used to support teaching.

Explorify - https://explorify.wellcome.ac.uk/ starter/plenary activities, ready to use. Short tasks. Easy to follow instructions. Also, useful CPD section on addressing common misconceptions the children may have.

BBC Bitesize – https://www.bbc.co.uk/bitesize Great for use across school, from Rec – KS2. Can search by topic. Videos, quizzes etc to support teaching and learning.

Plan Assessment https://www.planassessment.com/ useful for exemplification materials.

iNaturalist – A nature app. Installed on the iPads. Helps you to identify the plants and animals around you. Track life in our school grounds, learn about nature & create data.