

Scientists
learning experience at Merry Hill

Our Vision (Intent)

Science at Merry Hill intends to give all children a strong foundation for understanding of the world around them. We believe it is essential to develop and secure scientific knowledge and understanding, as well as embedding the skills of scientific enquiry. We want all children to develop themselves as confident communicators who use correct scientific vocabulary and experience a range of enquiry opportunities both in and out of the classroom.

We create meaningful connections to science by making links to previous learning. This along with overlearning opportunities will allow children to apply what they have learnt to a range of real life situations, current affairs and other areas of the curriculum. Our science curriculum is carefully sequenced to start with topics that link to the children's own life and experiences (for example, year 1's first topic is human bodies and senses). This further enables children to make connections with previous learning linked to their interests.

Whilst learning at home children are provided with many ideas to participate in science activities and experiments and resources used at school, such as the 'working scientifically wheel' are shared with families. Many children use the time to follow their own personal scientific interests. These experiences are highly valued and pupils are encouraged to share these with their peers and work collaboratively.

Members of the Eco Warriors council adopt a hands on approach in looking after the environment; they work tirelessly as '**Collaborative Learners**' to drive this across the school, modelling to all children the importance of being responsible citizens.

Our goal is for all pupils to leave Merry Hill with a natural curiosity about the world around them, a respect for the natural world and all its phenomena, and an understanding of their duty and role in protecting our fragile planet.

As the pupils progress throughout their time at Merry Hill, as a Scientist, they will be able to think critically and develop a more rigorous understanding 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
- are equipped with the **scientific knowledge** required to **understand the uses and implications** of science, today and for the future.

How we plan and teach Science (Implementation)

To ensure high standards of teaching and learning in Science, we implement a curriculum that is progressive throughout the whole school. Science is taught through termly whole school topics, focusing on the Statutory Framework for the Early Years Foundation Stage and the National Curriculum whilst also building on the interests of our children. Across the school we use and adapt the Herts for Learning progression in scientific knowledge document to ensure progression throughout the school.

In the Early Years Science is taught through Understanding of the World. In these lessons children start to gain scientific knowledge and skills that they'll build on throughout their education. Through continuous provision children are given opportunities to explore similarities, differences, patterns and change in the natural world. In the EYFS children's interests lead the curriculum and enhancements to continuous provision are made to meet the children's needs.

In Key Stage 1 Science is taught as discrete units and lessons but links to prior and current learning are made throughout all areas of the curriculum. Children build upon previously taught knowledge to further embed scientific understanding.

Each year group has a long term plan to map out when each topic will be taught and the areas of the curriculum that will be covered in each half term. Teachers then use the long term plans together with their knowledge of the children's current attainment and interests to plan each unit in more detail. Scientific enquiry wheels and knowledge organisers are used in each classroom to highlight the scientific skills and knowledge they are learning. We make use of high quality resources, such as Explorify, ASE – PLAN and PSTT to support teachers. Assessments are used to inform future planning to ensure work is suitably pitched to support and extend.

Opportunities include:

- Technology
- Group work
- Outdoor learning
- Continuous provision
- Weekly mini explorers sessions
- Talk for Writing to enable children to 'talk like a scientist'
- School trips
- Outside visitors
- Parental body involvement
- Science Week
- Discrete Understanding the World session in Reception each week
- 30 days wild – The Wildlife Trusts

Intended Impact on...

Pupil Voice

Children are inquisitive, asking questions about their surroundings and the people within their community. Children are retaining and correctly applying subject specific vocabulary. Children can articulate how their prior learning has helped them within that lesson when looking at books together.

Evidence in Knowledge and Understanding

Pupils have a secure understanding of key concepts and Scientific knowledge.

Application

Strong connections are made to real life examples and children can apply their knowledge in Science and across the curriculum.

Outcomes

At the end of each year we expect the children to achieve at least ARE for their year group. Some children will progress further and achieve greater depth. Children who have gaps in their knowledge receive appropriate support and interventions to enable them to keep up with our curriculum. Children will be well prepared for their next phase of learning.

Long Term Plan						
Units of Study	Autumn 1 Time Travellers	Autumn 2 Time Travellers	Spring 1 Dig a Little Deeper	Spring 2 Dig a Little Deeper	Summer 1 Summer Fun	Summer 2 Summer Fun
EYFS	Nursery and Reception continue to explore Understanding the World throughout the year.					
	Seasonal change including Harvest. (UW) Importance of personal hygiene – hand washing (PSED)	Observing Growth and change over time – baby to now/ seeds to plants.(UW) Health and wellbeing - Importance of exercise. (PSED)	Environmental changes – pollution, recycling and endangerment linked to Dinosaurs Freezing/ melting. Health and Wellbeing - Oral hygiene linked to dinosaur teeth/ bones (PSED)	Planting identifying what plants need to grow into healthy plants. (UW) Health and wellbeing – importance of healthy diet (PSED)	Animals (Incl pets) growth and change over time. Nocturnal animals (UW) Floating and Sinking Health and Wellbeing – importance of sleep (PSED)	Sea animals- habitat, diet, needs. (UW) Health and Wellbeing – healthy living (PSED)
Year One Seasonal change <u>Key Scientists:</u> Alex Beresford	Animals including humans – Funnybones <u>Key Scientists:</u> Marie Curie Alexander Graham Bell Thomas Edison	Materials – toys <u>Key Scientists:</u> Ole Kirk	Plants <u>Key Scientists:</u> Beatrix potter The Rose Gardens Mary Anning – History topic	Animals including Humans – Animals <u>Key Scientists:</u> Joan Proctor Eugenie Clarke Evelyn Chessman	Materials <u>Key Scientists:</u> Isambard Kingdom Brunel Charles Macintosh	
Year Two	Animals including Humans – Healthy Me <u>Key Scientists:</u> Louis Pasteur Professor Gilbert	Materials <u>Key Scientists:</u> John Dunlop George de Mestral	Animals including Humans – growth <u>Key Scientists:</u> Charles Darwin Noel Fitzpatrick – The Super Vet	Plants <u>Key Scientists:</u> Meg Lowman Wangari Maathai Jane Goodhall – History topic	Living things and Habitats <u>Key Scientists:</u> David Attenborough Maria Merian – insect lifecycles	Materials <u>Key Scientists:</u> Jaime Garcia
Continuous Provision	Based on the children’s interests. Mini Forest Explorers, weather charts, Science displays, Investigation station					

Extra-Curricular Activity	King George's Park Visits – Year 1 Seasons Dogs Trust visit to school – Looking after pets Nite Owls Allotment – Reception Farm - Reception
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Scientific Enquiry Types	
EYFS	KS1
<p>Birth to 5- Understanding the World: The World. Range 5 (36-48mths)</p> <ul style="list-style-type: none"> • Comments and asks questions about aspects of their familiar world such as the place where they live or the natural world • Talks about why things happen and how things work <ul style="list-style-type: none"> • Developing an understanding of growth, decay and changes over time • Shows care and concern for living things and the environment • Begin to understand the effect their behaviour can have on the environment <p>Range 6 (48- 60mths)</p> <ul style="list-style-type: none"> • Looks closely at similarities, differences, patterns and change in nature • Knows about similarities and differences in relation to places, objects, materials and living things • Talks about the features of their own immediate environment and how environments might vary from one another • Makes observations of animals and plants and explains why some things occur, and talks about changes 	<p>During years 1 and 2, pupils should be taught to use the following practical scientific methods, processes and skills through the teaching of the programme of study content:</p> <ul style="list-style-type: none"> • Asking simple questions and recognising that they can be answered in different ways • Observing closely using simple equipment • Performing simple tests • Identifying and classifying • Use their observations and ideas to suggest answers to questions • Gathering and recording data to help in answering questions <p>Types of enquiry</p> <ul style="list-style-type: none"> • Fair testing • Research from secondary sources • Observing over time • Identifying and classifying • Looking for patterns

Scientific Enquiry Progression		
EYFS	Year 1	Year 2
Asking Questions		
<ul style="list-style-type: none"> be curious and start to ask questions 	<ul style="list-style-type: none"> begin to ask simple questions and start to recognise that they can be answered in different ways recognise scientific and technical developments that help us 	<ul style="list-style-type: none"> ask simple questions and recognise that they can be answered in different ways listening to the views of others recognise and begin to explain some simple scientific and technical developments that help us
Planning		
<ul style="list-style-type: none"> sort and match things find things that are similar or different 	<ul style="list-style-type: none"> perform simple tests or follow teachers' instructions with support with clear guidance describe what they will do with guidance, begin to identify things to measure or observe that are relevant to the question uses resources provided uses simple measurements and equipment to gather data suggest why an experiment is unfair 	<ul style="list-style-type: none"> perform simple tests or follow teachers' instructions with increasing independence with some guidance, suggest what they will do with guidance, more confidently identify things to measure or observe that are relevant to the question and start to explain their reasoning for their choices begins to choose the type of simple equipment that might be used from a reasonable range uses appropriate equipment and measurements with reasonable accuracy recognises when a simple fair test is needed with help, decides how to set up a fair test and control variables
Obtaining and presenting evidence		
<ul style="list-style-type: none"> perform simple tests and use equipment make simple records of what I notice or how things change talk about what I have done and notice 	<ul style="list-style-type: none"> with help, record their findings using simple diagrams, sorting circles and talk/text templates talk about their findings using everyday terms, text scaffolds or simple scientific language 	<ul style="list-style-type: none"> with help, record their findings as pictograms, tally charts, block diagrams tables and writing templates talk about their findings using everyday terms, independently use text scaffolds and simple but accurate scientific language
Considering and evaluating evidence		
<ul style="list-style-type: none"> use senses to observe and look closely look closely at things and notice changes 	<ul style="list-style-type: none"> Start to use simple observable features to compare objects, materials and living things decide how to sort and group objects with teacher support begins to notice changes (i.e. cause and effect), patterns and relationships (i.e. how one variable affects another) 	<ul style="list-style-type: none"> use simple observable features to compare objects, materials and living things identify and classify (decide how to sort and group objects)

	<ul style="list-style-type: none"> • begins to talk about what they have found out and how they found it out • use their observations and ideas to suggest answers to some questions • use some comparative language to describe changes, patterns and relationships • with teacher support suggest whether or not what happened was what they expected • with teacher support suggest different ways they could have done things 	<ul style="list-style-type: none"> • with guidance, begins to notice changes (i.e. cause and effect), patterns and relationships (i.e. how one variable affects another) • talks about what they have found out and how they found it out • use their observations and ideas to suggest answers to questions • use comparative language to describe changes, patterns and relationships • with support, suggest whether or not what happened was what they expected • with support, suggest different ways they could have done things
<u>Key Vocabulary</u> Question, same, different, what, where, why, how, best, worst, change, look, biggest, smallest, group	<u>Key Vocabulary</u> Compare, predict, observe, because, explain, equipment, identify, sort, group, differences, similarities, describe, measure, test, results, diagram, table, plan	<u>Key Vocabulary</u> Prediction, fair test, conclusion, explain, describe, patterns, identify, evidence, observe, describe, bar chart, table, diagram, investigate, record, units, research, method

Curriculum Focus: Plants Progression of knowledge and understanding		
EYFS	Year 1	Year 2
<ul style="list-style-type: none"> • identify something as a plant • name some common plants, identify leaf, root, stem and flower • recognise that plants need water to grow • name some places plants live • identify the seeds in a fruit 	<ul style="list-style-type: none"> • make observations of plants, including flowers they have planted • identify the leaf, root, stem and flower of a plant • identify the trunk, branch, roots and leaves of a tree • state that plants produce seeds • identify differences between plants • identify and name a variety of common wild and garden plants, including deciduous and evergreen trees • name some common plants • name some plants that live in the garden • name some plants that live in the wild • name some trees in our woodland/field area • recognise that different plants live in the local environment • use simple identification guides to name plants in the local environment • Identify and describe the basic structure of a variety of common flowering plants, including trees. • compare and contrast different plants • sequence pictures of how plants changes over time • describe how deciduous trees change throughout the year • explain why some plants are only seen at certain times of the year 	<ul style="list-style-type: none"> • describe how flowering plants produce seeds which grow into new plants • name some plants that have bulbs from which they grow • make observations of plants over time • explore how plants grow from seeds and bulbs • describe what happens to bulbs during the plant cycle as they grow • describe what happens to a seed as it grows and develops • describe what they observe as new plants grow • observe and describe how seeds and bulbs grow into mature plants • <i>compare the plant cycle for a plant from a seed with that from a bulb</i> • suggest how to find out about what plants need in order to grow well • recognise that plants are living and need water, light and warmth to grow • describe differences between plants grown in the light and in the dark • Find out and how plants need water, light and a suitable temperature to grow and stay healthy. • Name some trees in Bushey (ie Rose Gardens and our school grounds) • explain how to look after a variety of plants

	<p>WS Task: Observing over time - Growing Sunflowers Identifying and classifying- Eating Plants</p>	<ul style="list-style-type: none"> describe how seed and bulb both contain everything a plant needs to grow explain that seeds and bulbs do not need light to germinate and identify how this is different to the needs of a plant explain how plants in the desert survive with little water and plants in the rainforest survive with little light <p>WS Task: Observing over time- Observing germination</p>
<p><u>Key Vocabulary</u> Root, stem, tree, leaf, flower, water, seed, plant</p>	<p><u>Key Vocabulary</u> Petal, wild, trunk, similar, different, soil, blossom, fruit, leaves, branch, bulbs, shrub, alive, vegetables, grass, garden, deciduous, evergreen, compost</p> <p>Flower names – daisy, daffodil, tulip, nettle, dandelion</p>	<p><u>Key Vocabulary</u> As for Year 1 plus light, shade, sun, warm, cool, water, grow, healthy</p>

Curriculum Focus: Animals Including Humans Progression of knowledge and understanding		
EYFS	Year 1	Year 2
<ul style="list-style-type: none"> name some places animals live identify and locate parts of their body identify and locate parts of animals bodies use their observations to describe humans and other animals can identify types of exercise name baby, child, adult and the young of some other animals describe and observe change over time know the importance of exercise know the importance of oral hygiene, Know the importance of sleep, 	<ul style="list-style-type: none"> identify and name a selection of animals identify and sort animals into different groups name the different groups of animals identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals make observations of animals describe how animals eat different types of food identify the food of some common animals recall and use the words: carnivore, herbivore and omnivore 	<ul style="list-style-type: none"> recognise that animals produce young notice that animals, including humans, have offspring which grow into adults recognise changes that take place as animals get older explain that adult animals no longer grow describe some differences they observe between babies and toddler make comparisons of the differences they observe between babies and toddlers identify the offspring of a selection of different animals

<ul style="list-style-type: none"> know why fruit and vegetables are important in a healthy diet 	<ul style="list-style-type: none"> identify and name a variety of common animals that are carnivores, herbivores and omnivores group animals that belong to: carnivores, herbivores and omnivores use their observations to point out differences between humans and other animals and between animals and non-living things describe and compare the structure of a variety of common animals (fish, amphibians, reptiles, birds and mammals, including pets) identify and locate the sense organs use senses to describe textures, sounds and smells compare differences in texture, sounds and smells name and locate the basic parts of the human body draw and label a simple body outline describe differences between the different animal groups (e.g. birds have feathers but mammals have fur) identify animals which are more likely to be seen in different seasons explain why some animals are only seen at night <p>WS Task: identifying and classifying – animal groups</p>	<ul style="list-style-type: none"> use evidence to show that adult animals no longer grow use evidence to show that children of the same age are not all the same size use evidence to show that older children are generally taller than younger children find out about and describe the basic needs of animals, including humans, for survival (water, food and air) explain how to look after a pet describing what it needs to survive describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene recognise that exercise is important name some types of food identify some types of food that make up their diet and name some examples of each recognise that an adequate diet and exercise are necessary for them to grow and stay healthy describe some of the types of food that they eat <p>WS Task: looking for patterns – Do taller people run faster?</p>
<p><u>Key Vocabulary</u> animal, head, legs, arms, knee, elbow, neck, face, feet, hands, bread, potatoes, apples, cereals, rice, meat, fish, fruit, vegetables, milk, running, jumping, swimming, walking, chicken, hen, kitten, cat, puppy, dog, duckling, duck</p>	<p><u>Key Vocabulary</u> human body, elbows, teeth, paw, mouth, teeth, arm, neck, knees, hoof, tail, fin, shell, skin, wings, beak, fur, scales, feathers, tongue, taste, nose, smell, eyes, vision, sight, skin, touch, feel, ears, hearing, fish, amphibians, reptiles, insects, birds,</p>	<p><u>Key Vocabulary</u> growth, develop, offspring, reproduce, elderly, adults, teenager, child, toddler, baby, young, live young, healthy, hygiene, balanced diet, exercise, survive, hygiene, germs, disease</p>

	reptiles, mammals, pets, omnivore, herbivore, carnivore	
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Curriculum Focus: Uses of Everyday Materials Progression of knowledge and understanding		
EYFS	Year 1	Year 2
<ul style="list-style-type: none"> • make observations of common objects • make observations of materials • arrange materials into groups • identify when changes occur e.g. when food is cooked • explore objects which float and sink. • consider why objects float and sink. • explore objects which are frozen and investigate ways to make them melt. 	<ul style="list-style-type: none"> • name some common materials • name some common objects around the school and home • distinguish between an object and the material from which it is made • name materials which have lots of different uses (e.g. paper- wrapping paper, tissue paper, writing paper, birthday card) • identify some naturally occurring materials: wood, rock, water • identify some man-made materials: glass, metal, plastic • identify and name a variety of everyday materials, including wood, plastic, glass, metal, water, and rock • describe objects that are made from lots of different materials • names objects that are sometimes made from different materials (e.g. spoons- plastic, wooden, metal) • make observations of common objects and the different materials they are made of • 	<ul style="list-style-type: none"> • identify uses of some common materials • give a reason why a material is suitable for its job • recognise that some materials will have more than one property which increases its suitability for its purpose (e.g. glass is transparent, rigid and weatherproof) • identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses • suggest several reasons why a material may or may not be suitable for a particular purpose • explain why one material may be more suitable for a purpose than another by discussing properties • explain why plastics cause problems in the oceans • explain the importance of reusing and recycling plastic • describe how swimsuits have changed over time and how the fabric is now more suitable

	<p>communicate these observations using descriptive words (e.g. bendy, rough, hard)</p> <ul style="list-style-type: none"> • identify some properties of materials (e.g. see through, waterproof, absorbent) • describe the simple physical properties of a variety of everyday materials • make predictions about which materials will float and sink • compare and group together a variety of everyday materials on the basis of their simple physical properties (both visible and nonvisible) • explain why people started using reusable bags rather than plastic bags <p>WS Task: Comparative and fair testing- Testing waterproofness of materials</p>	<ul style="list-style-type: none"> • describe how scientists have invented new materials • identify materials that can be easily changed with force • identify materials that cannot be easily changed with force • describe pushes and pulls needed to change a material as big or small • find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching • describe changes in shapes as a result of the action of pushes, pulls and twists • explain why some materials change shape when a force acts (i.e. push, pull, twist, stretch) as a result of their properties <p>WS Task: research from secondary sources – recycling</p>
<p><u>Key Vocabulary</u> brick, paper, hard/ soft, bendy/ not bendy, rough/ smooth, wet, dry, freeze, melt, same, different, recycling, damp, float, sink</p>	<p><u>Key Vocabulary</u> wood, plastic, glass, metal, water, rock, fabric, elastic, foil, stretchy/ stiff, shiny/ dull, waterproof/ not waterproof, absorbent/ non absorbent</p>	<p><u>Key Vocabulary</u> wood, metal, plastic, glass, brick, rock, paper, cardboard, spoons, plastic, rubber, waterproof fabric, metal, coins, cans, cars, table, legs, wood matches, floors, telegraph poles, wood, squashing, bending, twisting, stretching</p>

Curriculum Focus: Living Things and their Habitats Progression in knowledge and understanding		
EYFS	Year 1	Year 2
See animals including humans	<ul style="list-style-type: none"> • observe changes across the four seasons • identify what to observe when looking at evidence of the seasons 	<p>Pupils should be taught to:</p> <ul style="list-style-type: none"> • explore and compare the differences between things that are living, dead, and things that have never been alive

	<ul style="list-style-type: none"> • use descriptive words, photos and pictures to record changes • collect evidence of changes (e.g. leaves, seeds, flowers) • name the four seasons • recall simple changes associated with each season • observe and name types of weather (e.g. rain, sun, wind, clouds) • observe and describe weather associated with the seasons and how day length varies • identify what to measure about the weather • used prepared tables and charts to record data • use secondary data to describe weather in another setting • explain why animals are easier to spot at different times of year (e.g. migrating birds, hibernating animals) <p>WS Task: observing over time – weather, rainfall</p>	<ul style="list-style-type: none"> • identify that most living things live in habitats to which they are suited and describe how different habitats provide for the basic needs of different kinds of animals and plants, and how they depend on each other • identify and name a variety of plants and animals in their habitats, including microhabitats • describe how animals obtain their food from plants and other animals, using the idea of a simple food chain, and identify and name different sources of food. <p>WS Task: Observing over time/ pattern seeking- microhabitats</p>
<p><u>Key Vocabulary</u> animal, head, legs, arms, knee, elbow, neck, face, feet, hands, bread, potatoes, apples, cereals, rice, meat, fish, milk, running, jumping, swimming, walking, chicken, hen, kitten, cat, puppy, dog, duckling, duck</p>	<p><u>Key Vocabulary</u> seasons, autumn, spring, summer, winter, deciduous, evergreen, shoot, fruit, earth, seeds, leaves, flowers, reproduce, babies/adults, life cycles, birds, insects, cold, warm, hot, sunrise, sunset</p> <p>Weather types – rain, hail, snow, ice, frost, sun, showers, wind</p>	<p><u>Key Vocabulary</u> living, dead, never alive, Habitats, micro-habitats, food, food chain, sun, grass, cow, human, alive, healthy Logs, leaf litter, stony path, under bushes, shelter, seashore, woodland, ocean, rainforest, conditions hot/warm/cold dry/damp/wet bright/shade/dark</p>

Curriculum Focus: Forces Progression of knowledge and understanding		
EYFS	Year 1	Year 2
<ul style="list-style-type: none"> Observe and describe movements they and objects make 		
<u>Key Vocabulary</u> Push, pull, twist, squash, stretch		

Curriculum Focus: Electricity Progression of knowledge and understanding		
EYFS	Year 1	Year 2
<ul style="list-style-type: none"> Know electricity can be dangerous Explore a range of battery powered devices 		
<u>Key Vocabulary</u> Battery, electricity, switch, bulb, danger, power, plug		

