

Who are we?

The children at Lace Hill are very eager to learn and communicate well verbally. They are polite and sociable and keen to please.

Through the teaching and learning of science, we aspire to create competent and curious scientists. We encourage children to observe and ask questions about phenomena to help them better understand the world around them, and support this by providing practical enquiries and experimentation wherever possible to bring the topics to life. We carefully map out the science curriculum for every year group to ensure that pupils' science knowledge and their scientific skills are built upon throughout lessons, as well as enabling them to use previous learning from science and other subjects to create confident and independent scientists.

At Lace Hill Academy, we follow the National Curriculum, which revisits topics and builds on previous knowledge, allowing children to know more and remember more as they progress. We teach science through discrete lessons, however teachers do try to link and make connections with other subjects where possible.


What do we need to know? Why?

At Lace Hill Academy, our intent, when teaching science, is to spark the children's curiosity in order for them to develop their knowledge, skills and understanding. Our children need to understand how science has changed our lives and is vital to the world's future prosperity. They need to recognise the power of rational explanation and be excited and curious about the world around them. We need to encourage them to understand how science can help us explain what is occurring, predict how things will behave and analyse the causes. Our children need to recognise essential aspects of the knowledge, methods, processes and uses of science. They need to build up a body of knowledge, skills and concepts to develop their understanding of the world we live in.

Our science curriculum reflects the importance of spoken language in pupils' development across the whole curriculum. Teachers model scientific vocabulary so that children can learn to articulate scientific concepts clearly and precisely. Our science curriculum is also rich in investigations and experiments so that children can learn to ask perceptive questions, make predictions, set up enquiries, think critically, report findings and draw conclusions. Through focus on these skills, our children will develop confidence, resilience and independent in their thinking. Our children need to develop a desire to embrace challenging activities, including opportunities to undertake investigations across a range of science units.

What do we need to experience? Why?

| When a child leaves our school they will... | I am a Lace Hill scientist because... |
|--|--|
| <ul style="list-style-type: none"> • Be a confident person • Be an independent thinker and self-starter • Empathise with others • Have an inquisitive mind • Take risks with their learning • Bounce back and move forward when faced with a challenge • Be proactive and innovative • Have a sense of belonging | <ul style="list-style-type: none"> • I am curious about phenomena around me • I can observe phenomena and make comparisons • I can create my own enquiries and report findings appropriately • I can use scientific language accurately • I can present my work in a scientific and logical manner to best display my results |

| Substantive Concepts | Disciplinary Concepts |
|---|--|
| <p>Children need to understand that whilst there are three substantive concepts, each of these draw on common concepts and can be linked. They will also learn about important scientific discoveries within these concepts.</p> <p>Biology Children need to understand living organisms and life, learning about complex systems involving interactions between genes, the environment and random chance.</p> <p>Animals including humans Living things and their habitats Plants</p> <p>Chemistry Within chemistry, children learn through models and modelling to explain the behaviour of matter and the combination of components of objects studied.</p> <p>Materials States of matter</p> <p>Physics Physics assumes that entities behave identically. Within this concept, children learn to create explanations based on measurable quantities that can be put into numerical relationships.</p> <p>Energy Forces Earth and Space</p> | <ul style="list-style-type: none"> • Observing over time (observe and take measurements) • Pattern seeking (enquire and predict) • Comparative and fair testing (investigate) • Using methods to answer questions (investigate) • Using apparatus and techniques (investigate) • Identifying, classifying and grouping (investigate) • Researching (research theories and evidence) • Using evidence to develop explanations (research theories and evidence) • Collecting, analysing and presenting data (record and report findings) <div data-bbox="1265 609 1895 1139">  </div> |

Science Curriculum at Lace Hill Academy

At Lace Hill Academy, our science curriculum is designed so that our children frequently encounter key disciplinary concepts which directly link to our science 'Golden Box' (above) which is what we want our Lace Hill scientists to be able to achieve. Underpinning our units of work are three substantive concepts that thread our curriculum together. These concepts are the scientific knowledge referred to in the National Curriculum and are the subject disciplines: biology, chemistry and physics.

We place great importance on practical experiments to enhance the science curriculum; children need to see science in action in order to generate curiosity and develop their questioning and prediction skills. We use scientific equipment (including resources from a local science specialist secondary school) to achieve this and, where possible, visitors and visits to excite and enthuse our children about the world around them. For example, we loan electrical resources from the secondary school for our Y4 and Y6 electricity units, our Y5 class visit the Space Centre in Leicester to enhance their Earth and Space topic, and our Y2 class take part in a local science fair. Cross curricular outcomes in science are specifically planned for, with strong links between the maths and science curriculum when presenting and analysing data.

Our children need to experience science via our disciplinary concepts: observing over time; pattern seeking; identifying, classifying and grouping; comparative and fair testing (controlled investigations); and researching using secondary sources to develop explanations. Our children should seek answers to questions through the use of known methods using apparatus and techniques to collect, analyse and present data. By experiencing all of these processes, our children will be 'working scientifically' and be well prepared for secondary school.

Science Curriculum at Lace Hill Academy

| LHA Science Journey (Progression) | | | | | | | |
|-----------------------------------|---|---|---|--|--|--|---|
| | Early Years | Year 1 | Year 2 | Year 3 | Year 4 | Year 5 | Year 6 |
| Units covered | Skills are taught through the Early Years curriculum area 'Understanding the World'. | Which materials could the wolf blow down? How can keep our pets happy? What do we know about the weather? What's growing in our gardens? How do our senses help us? | Is this material waterproof? How do animals survive? Who lives here? How do seeds grow? Who eats who? | How can we keep ourselves healthy? What can rocks and fossils tell us? Can we see in the dark? What is a force? Fruit, shoot, leaf or root? | How can we protect living things in our locality? Can you hear me? Could we spend a day without electricity? What happens to the rain? What happens to my food? | How can you separate materials? How does the solar system work? How does a caterpillar become a butterfly? Can you feel the force? How different are we to our grandparents? | Why is our heart the most important pump we own? How can we adapt circuits? How do we really see? How do we classify living things? Are humans still evolving? What is the science behind sport? |
| Trips/Visits | Larder Café and Farm | Green Dragon Eco Farm | Pitt Rivers Museum Y2 Science Fair | Chiltern Open Air Museum | Gawcott Solar Farm | Space Centre Y5 Science Fair | Silverstone Museum |
| Disciplinary Concepts | Observing over time; Pattern seeking; Using apparatus and techniques; Identifying, classifying and grouping | Observing over time; Pattern seeking; Comparative and fair testing; Using methods to answer questions; Using apparatus and techniques; Identifying, classifying and grouping; Collecting, analysing and presenting data | Observing over time; Pattern seeking; Comparative and fair testing; Using methods to answer questions; Using apparatus and techniques; Identifying, classifying and grouping; Collecting, analysing and presenting data | Observing over time; Pattern seeking; Comparative and fair testing; Using methods to answer questions; Using apparatus and techniques; Identifying, classifying and grouping; Researching; Using evidence to develop explanations; | Observing over time; Pattern seeking; Comparative and fair testing; Using methods to answer questions; Using apparatus and techniques; Identifying, classifying and grouping; Researching; Using evidence to develop explanations; | Observing over time; Pattern seeking; Comparative and fair testing; Using methods to answer questions; Using apparatus and techniques; Identifying, classifying and grouping; Researching; Using evidence to | Observing over time; Pattern seeking; Comparative and fair testing; Using methods to answer questions; Using apparatus and techniques; Identifying, classifying and grouping; Researching; Using evidence to develop explanations; |

Science Curriculum at Lace Hill Academy

| | | | | | | | |
|-----------------------------|---|--|---|---|--|--|--|
| | | | | Collecting, analysing and presenting data | Collecting, analysing and presenting data | develop explanations; Collecting, analysing and presenting data | Collecting, analysing and presenting data |
| Substantive Concepts | Living things and their habitats; Plants; Materials | Animals including humans; Plants; Materials; Earth and Space | Animals including humans; Living things and their habitats; Plants; Materials | Animals including humans; Plants; Materials; Energy; Forces | Animals including humans; Living things and their habitats; States of matter; Energy | Animals including humans; Living things and their habitats; Materials; Forces; Earth and Space | Animals including humans; Living things and their habitats; Energy |

LHA Science Journey (Progression in Knowledge and Skills)

Biology

| Plants | Early Years | Year 1 | Year 2 | Year 3 | Year 4 | Year 5 | Year 6 |
|--------|---|---|--|--|--------|--------|--------|
| | Nursery observe the growing process from seed to plant grow, harvest and share produce that they have grown Reception grow and take care of plants explore the natural world around them, making observations and drawing pictures of animals and plants | identify and name common wild and garden plants including deciduous and evergreen 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 | | | |

Science Curriculum at Lace Hill Academy

| | | | | | | | |
|----------------------------------|---|--|---|--|--|--|--|
| | | | | explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal | | | |
| Animals including humans | Early Years | Year 1 | Year 2 | Year 3 | Year 4 | Year 5 | Year 6 |
| | | <p>identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals and say if they are carnivores, herbivores or omnivores</p> <p>describe and compare the structure of a variety of common animals</p> <p>identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense</p> | <p>notice that animals, including humans, have offspring which grow into adults</p> <p>find out about and describe the basic needs of animals, including humans, for survival (water, food and air)</p> <p>describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene</p> | <p>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</p> <p>identify that humans and some other animals have skeletons and muscles for support, protection and movement</p> | <p>describe the simple functions of the basic parts of the digestive system in humans</p> <p>identify the different types of teeth in humans and their simple functions</p> <p>construct and interpret a variety of food chains, identifying producers, predators and prey</p> | <p>describe the changes as humans develop to old age</p> | <p>identify and name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood</p> <p>recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function</p> <p>describe the ways in which nutrients and water are transported within animals, including humans</p> |
| Living things and their habitats | Early Years | Year 1 | Year 2 | Year 3 | Year 4 | Year 5 | Year 6 |
| | <p>Nursery</p> <p>begin to understand the need to respect and care for the natural</p> | | <p>explore and compare the differences between things that are living, dead and have never been alive</p> | | <p>recognise that living things can be grouped in a variety of ways</p> <p>explore and use classification keys to</p> | <p>describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird</p> | <p>describe how living things are classified into broad groups according to common observable characteristics and based on similarities</p> |

| | | | | | | | |
|-----------|---|--------|--|--------|--|---|--|
| | <p>environment and all living things</p> <p>be aware of our surroundings</p> <p>Reception 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</p> <p>learn about why recycling and caring for our environment is important</p> | | <p>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</p> <p>identify and name a variety of plants and animals in their habitats, including micro habitats</p> <p>describe how animals obtain their food from plants and other animals, using the idea of a simple food chain and name and identify different sources of food</p> | | <p>help group, identify and name a variety of living things in their local and wider environment</p> <p>recognise that environments can change and that this can sometimes pose dangers to living things</p> | <p>describe the life process of reproduction in some plants and animals</p> | <p>and differences, including micro-organisms, plants and animals</p> <p>give reasons for classifying plants and animals based on specific characteristics.</p> <p>recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago</p> <p>recognise that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents</p> <p>identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution</p> |
| | Chemistry | | | | | | |
| Materials | Early Years | Year 1 | Year 2 | Year 3 | Year 4 | Year 5 | Year 6 |

| | | | | | | | |
|--|--|---|--|---|--|---|--|
| | <p>Nursery</p> <p>name materials that can be recycled</p> <p>use all their senses in hands-on exploration of natural materials</p> <p>explore collections of materials with similar and/or different properties</p> | <p>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</p> <p>describe the simple physical properties of a variety of everyday materials</p> <p>compare and group together a variety of everyday materials on the basis of their simple physical properties</p> | <p>identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses</p> <p>find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching</p> | <p>compare and group together different kind of rocks on the basis of their appearance and simple physical properties</p> <p>describe in simple terms how fossils are formed when things that have lived are trapped within rock</p> <p>recognise that soils are made from rocks and organic matter</p> | | <p>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</p> <p>know that some materials will dissolve in liquid to form a solution</p> <p>use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating</p> <p>give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials including metals, wood and plastic</p> | |
| | <p>Reception</p> <p>explore the natural world around them</p> | | | | | | |

Science Curriculum at Lace Hill Academy

| | | | | | | | |
|------------------|--|--------|--------|--------|--|---|--------|
| | | | | | | <p>demonstrate that dissolving, mixing and changes of state are reversible changes</p> <p>explain that some changes result in the formation of new materials, and that this kind of change is not usually reversible, including changes associated with burning and the action of acid on bicarbonate of soda</p> | |
| States of matter | <p>Early Years</p> <p>Reception understand some important processes and changes in the natural world around them, including the seasons and changing states of matter</p> | Year 1 | Year 2 | Year 3 | Year 4 | Year 5 | Year 6 |
| | | | | | <p>compare and group materials together, according to whether they are solids, liquids or gases</p> <p>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</p> | | |

Science Curriculum at Lace Hill Academy

| | | | | | | | |
|-----------------|---|--|---------------|---------------|--|---|---------------|
| | | | | | identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature | | |
| Physics | | | | | | | |
| Earth and Space | Early Years Reception experience the natural environment and comment on seasonal changes understand some important processes and changes in the natural world around them, including the seasons and changing states of matter | Year 1 observe changes across the four seasons observe and describe weather associated with the seasons and how day length varies | Year 2 | Year 3 | Year 4 | Year 5 describe the movement of the Earth, and other planets, relative to the sun in the solar system describe the movement of the Moon relative to the Earth describe the Sun, Earth and Moon as approximately spherical bodies use the idea of the Earth's rotation to explain day and night and the apparent movement of the sun across the sky | Year 6 |
| Energy | Early Years | Year 1 | Year 2 | Year 3 | Year 4 | Year 5 | Year 6 |

| | | | | | | | |
|--|--|--|--|---|--|--|---|
| | | | | <p>recognise that they need light in order to see things and that dark is the absence of light</p> <p>notice that light is reflected from surfaces</p> <p>recognise that light from the sun can be dangerous and that there are ways to protect their eyes</p> <p>recognise that shadows are formed when the light from a light source is blocked by an opaque object</p> <p>find patterns in the way that the size of shadows change</p> | <p>identify how sounds are made, associating some of them with something vibrating</p> <p>recognise that vibrations from sounds travel through a medium to the ear</p> <p>find patterns between the pitch of a sound and features of the object that produced it</p> <p>find patterns between the volume of a sound and the strength of the vibrations that produced it</p> <p>recognise that sounds get fainter as the distance from the sound source increases</p> <p>identify common appliances that run on electricity</p> <p>construct a simple series electrical circuit, identifying and naming its basic</p> | | <p>recognise that light appears to travel in straight lines</p> <p>use the idea that light travels in straight lines to explain that objects are seen because they give out or reflect light into the eye</p> <p>explain that we see things because light travels from light sources to our eyes or from light sources to objects and then to our eyes</p> <p>use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them</p> <p>associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit</p> |
|--|--|--|--|---|--|--|---|

Science Curriculum at Lace Hill Academy

| | | | | | | | |
|--------|-------------|--------|--------|---|---|--|---|
| | | | | | <p>parts, including cells, wires, bulbs, switches and buzzers</p> <p>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</p> <p>recognise that a switch opens and closes a circuit and associate this with whether or not a lamp lights in a simple series circuit</p> <p>recognise some common conductors and insulators, and associate metals with being good conductors</p> | | <p>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</p> <p>use recognised symbols when representing a simple circuit in a diagram</p> |
| Forces | Early Years | Year 1 | Year 2 | Year 3 | Year 4 | Year 5 | Year 6 |
| | | | | <p>compare how things move on different surfaces</p> <p>notice that some forces need contact between two objects, but magnetic forces can act at a distance</p> | | <p>explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object</p> | |

| | | | | <p>observe how magnets attract or repel each other and attract some materials and not others</p> <p>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</p> <p>describe magnets as having two poles</p> <p>predict whether two magnets will attract or repel each other, depending on which poles are facing</p> | | <p>identify the effects of air resistance, water resistance and friction, that act between moving surfaces</p> <p>recognise that some mechanisms, including levers, pulleys and gears, allow a smaller force to have a greater effect</p> | |
|------------------------|--|---|--|---|--|---|---|
| Working Scientifically | | | | | | | |
| Working scientifically | Early Years | Year 1 | Year 2 | Year 3 | Year 4 | Year 5 | Year 6 |
| | <p>Nursery explore how things work</p> <p>Reception describe what they see, hear and feel whilst outside</p> | <p>observe phenomena closely, using magnifying glasses</p> <p>identify and group</p> <p>use senses to compare</p> | <p>observe phenomena over time</p> <p>identify and classify materials</p> <p>sort and classify</p> | <p>make observations</p> <p>collect data from own observations</p> <p>compare the effect of different factors</p> <p>raise questions</p> | <p>observe and record over a period of time</p> <p>observe patterns</p> <p>compare phenomena and suggest reasons for differences</p> | <p>ask pertinent questions and suggest reasons for similarities and differences</p> <p>plan different types of scientific enquiries</p> | <p>take necessary precautions to work safely</p> <p>work systematically</p> <p>take measurements with increasing accuracy and</p> |

Science Curriculum at Lace Hill Academy

| | | | | | | | |
|--|--|--|--|---|---|---|--|
| | | <p>compare and contrast phenomena through videos and photographs</p> <p>draw diagrams</p> <p>perform simple tests</p> <p>make simple tables/charts</p> | <p>construct a food chain</p> <p>set up a comparative test</p> <p>make recordings using charts</p> | <p>set up simple practical enquiries</p> <p>report on findings using oral explanation</p> <p>use drawings and label diagrams</p> <p>draw simple conclusions</p> <p>use relevant scientific language</p> <p>research and make use of secondary sources</p> | <p>compare their ideas with models or images</p> <p>raise questions about their own research</p> <p>use different types of scientific enquiry</p> <p>use and make simple guides or keys</p> <p>take accurate measurements using a range of equipment</p> <p>report on findings with oral and written explanations</p> | <p>recognise and control variables</p> <p>take measurements using a range of scientific equipment</p> <p>record data and results using diagrams, labels, tables and bar graphs</p> <p>report and present findings in oral and written forms</p> <p>use test results to make predictions</p> <p>discuss how chemical changes have an impact on our lives</p> | <p>precision and take repeat readings where appropriate</p> <p>record data and results using diagrams, classification keys, scatter graphs and line graphs</p> <p>report and present findings including causal relationships and explanations of and degree of trust</p> <p>use results to make predictions to set up further tests</p> <p>identify scientific evidence that has been used to support or refute ideas or arguments</p> <p>research unfamiliar animals and plants and decide where they belong in the classification system</p> <p>explore the work of scientists</p> |
|--|--|--|--|---|---|---|--|

Science Curriculum at Lace Hill Academy

| | | | | | | | |
|--|--|--|--|--|--|--|---|
| | | | | | | | analyse advantages and disadvantages |
|--|--|--|--|--|--|--|---|