



## SCIENCE POLICY

**Date: March 2019**

**Signed:**

**Review: March 2020**

## 1. **Aims**

At Hayton we believe that the best science teaching fosters and develops pupils' curiosity in the subject whilst also helping them to fulfil their potential. For our pupils to achieve well in science, they need to acquire the necessary scientific knowledge and also be able to enjoy the experience of engaging and purposeful scientific enquiry in order to help them to answer scientific questions about the world around them.

The new National Curriculum 2014 states why we teach science in schools:

'A high-quality science education provides the foundations for understanding the world through the specific disciplines of biology, chemistry and physics...Through building up a body of key foundational knowledge and concepts, pupils should be encouraged to recognise the power of rational explanation and develop a sense of excitement and curiosity about natural phenomena.'

Through high-quality science teaching, we aim to help our pupils understand how major scientific ideas have played a vital role in society. Moreover, we aim to prepare our pupils for life in an increasingly scientific and technological world.

## 2. **Objectives**

We aim to do this by:

- Delivering high quality, interesting and engaging science lessons;
- Using scientific contexts to develop and consolidate cross curricular skills in literacy, Maths and ICT;
- Teaching science in a global and historical context; including the contributions significant scientists from a range of cultures;
- Developing and extending pupils' scientific knowledge and understanding;
- Developing pupils' ability to work scientifically and involve pupils in planning, carrying out and evaluating investigations;
- Developing pupils' scientific vocabulary and ability to articulate scientific concepts clearly and precisely;
- Ensuring that all pupils are appropriately challenged to make good progress in science.

## 3. **Teaching and Learning**

At Hayton, teachers plan and deliver high-quality and engaging science lessons incorporating a range of teaching and learning styles. At Hayton teachers will provide opportunities for pupils to:

- Learn about science, where possible, through first-hand practical experiences;

- Develop their research skills through the appropriate use of secondary sources;
- Work collaboratively in pairs, groups and/or individually;
- Plan and carry out investigations with an increasing systematic approach as they progress through the school;
- Develop their questioning, predicting, observing, measuring and interpreting skills;
- Record their work in a variety of ways e.g. writing, diagrams, graphs, tables;
- Read and spell scientific vocabulary appropriate for their age.
- Be motivated and inspired by engaging and interactive science displays which include key vocabulary and relevant questions.
- Learn about science using the outdoor learning environment.

#### 4. Planning

Science will be planned and taught as an independent subject through separate units of work. Where possible, teachers will link their units of work within Science to the topic they are exploring within the rest of the curriculum. Teachers will also ensure that children are given the opportunity to work in a cross-curricular way when possible. Units of work are planned using the key questions of the unit of work with each lesson then exploring the question as an objective. Pupil progress towards these objectives will be recorded by teachers as part of their class recording system and once a term shared with the Science subject leader for whole school tracking purposes. Teachers plan according to a topic and are guided by the elements laid out in the national curriculum (see below).

Title	Key Stage 1	Key Stage 2
Working scientifically	Across all year groups scientific knowledge and skills should be learned by working scientifically. (This is documented in the Essentials for progress section.)	
Biology	Plants <ul style="list-style-type: none"> <li>• Identify, classify and describe their basic structure.</li> <li>• Observe and describe growth and conditions for growth.</li> </ul> Habitats <ul style="list-style-type: none"> <li>• Look at the suitability of environments and at food chains.</li> </ul>	Plants <ul style="list-style-type: none"> <li>• Look at the function of parts of flowering plants, requirements of growth, water transportation in plants, life cycles and seed dispersal.</li> </ul> Evolution and inheritance <ul style="list-style-type: none"> <li>• Look at resemblance in offspring.</li> <li>• Look at changes in animals over time.</li> <li>• Look at adaptation to environments.</li> <li>• Look at differences in offspring.</li> <li>• Look at adaptation and evolution.</li> <li>• Look at changes to the human skeleton over time.</li> </ul> Animals and humans <ul style="list-style-type: none"> <li>• Look at nutrition, transportation of water and nutrients in the body, and the muscle and</li> </ul>

	<p>Animals and humans</p> <ul style="list-style-type: none"> <li>• Identify, classify and observe.</li> <li>• Look at growth, basic needs, exercise, food and hygiene.</li> </ul> <p>All living things*</p> <ul style="list-style-type: none"> <li>• Investigate differences.</li> </ul>	<p>skeleton system of humans and animals.</p> <ul style="list-style-type: none"> <li>• Look at the digestive system in humans.</li> <li>• Look at teeth.</li> <li>• Look at the human circulatory system.</li> </ul> <p>All living things</p> <ul style="list-style-type: none"> <li>• Identify and name plants and animals</li> <li>• Look at classification keys.</li> <li>• Look at the life cycle of animals and plants.</li> <li>• Look at classification of plants, animals and micro-organisms.</li> <li>• Look at reproduction in plants and animals, and human growth and changes.</li> <li>• Look at the effect of diet, exercise and drugs.</li> </ul>
Chemistry	<p>Materials</p> <ul style="list-style-type: none"> <li>• Identify, name, describe, classify, compare properties and changes.</li> <li>• Look at the practical uses of everyday materials.</li> </ul>	<p>Rocks and fossils</p> <ul style="list-style-type: none"> <li>• Compare and group rocks and describe the formation of fossils.</li> </ul> <p>States of matter</p> <ul style="list-style-type: none"> <li>• Look at solids, liquids and gases, changes of state, evaporation, condensation and the water cycle.</li> </ul> <p>Materials</p> <ul style="list-style-type: none"> <li>• Examine the properties of materials using various tests.</li> <li>• Look at solubility and recovering dissolved substances.</li> <li>• Separate mixtures.</li> <li>• Examine changes to materials that create new materials that are usually not reversible.</li> </ul>
Physics	<p>Light*</p> <ul style="list-style-type: none"> <li>• Look at sources and reflections.</li> </ul> <p>Sound*</p> <ul style="list-style-type: none"> <li>• Look at sources.</li> </ul> <p>Electricity*</p> <ul style="list-style-type: none"> <li>• Look at appliances and circuits.</li> </ul> <p>Forces</p> <ul style="list-style-type: none"> <li>• Describe basic movements.</li> </ul> <p>Earth and space</p> <ul style="list-style-type: none"> <li>• Observe seasonal changes.</li> </ul>	<p>Light</p> <ul style="list-style-type: none"> <li>• Look at sources, seeing, reflections and shadows.</li> <li>• Explain how light appears to travel in straight lines and how this affects seeing and shadows.</li> </ul> <p>Sound</p> <ul style="list-style-type: none"> <li>• Look at sources, vibration, volume and pitch.</li> </ul> <p>Electricity</p> <ul style="list-style-type: none"> <li>• Look at appliances, circuits, lamps, switches, insulators and conductors.</li> <li>• Look at circuits, the effect of the voltage in cells and the resistance and conductivity of materials.</li> </ul> <p>Forces and magnets</p> <ul style="list-style-type: none"> <li>• Look at contact and distant forces, attraction and repulsion, comparing and grouping materials.</li> <li>• Look at poles, attraction and repulsion.</li> <li>• Look at the effect of gravity and drag forces.</li> </ul>

		<ul style="list-style-type: none"> <li>• Look at transference of forces in gears, pulleys, levers and springs.</li> </ul> <p>Earth and space</p> <ul style="list-style-type: none"> <li>• Look at the movement of the Earth and the Moon</li> <li>• Explain day and night</li> </ul>
Note:	* Items marked * are not statutory.	

## 5. Assessment and Recording

Teachers assess Science using Chris Quigley milestones:

		<b>Milestone 1: Year 1 and Year 2</b>	<b>Milestone 2: Year 3 and Year 4</b>	<b>Milestone 3: Year 5 and Year 6</b>
	To work scientifically	<ul style="list-style-type: none"> <li>• Ask simple questions.</li> <li>• Observe closely, using simple equipment.</li> <li>• Perform simple tests.</li> <li>• Identify and classify.</li> <li>• Use observations and ideas to suggest answers to questions.</li> <li>• Gather and record data to help in answering questions.</li> </ul>	<ul style="list-style-type: none"> <li>• Ask relevant questions.</li> <li>• Set up simple, practical enquiries and comparative and fair tests.</li> <li>• Make accurate measurements using standard units, using a range of equipment, e.g. thermometers and data loggers.</li> <li>• Gather, record, classify and present data in a variety of ways to help in answering questions.</li> <li>• Record findings using simple scientific language, drawings, labelled diagrams, bar charts and tables.</li> <li>• Report on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions.</li> <li>• Use results to draw simple conclusions and suggest improvements, new questions and predictions for setting up further tests.</li> </ul>	<ul style="list-style-type: none"> <li>• Plan enquiries, including recognising and controlling variables where necessary.</li> <li>• Use appropriate techniques, apparatus, and materials during fieldwork and laboratory work.</li> <li>• Take measurements, using a range of scientific equipment, with increasing accuracy and precision.</li> <li>• Record data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, bar and line graphs, and models.</li> <li>• Report findings from enquiries, including oral and written explanations of results, explanations involving causal relationships, and conclusions.</li> <li>• Present findings in written form, displays and other presentations.</li> </ul>

			<ul style="list-style-type: none"> <li>• Identify differences, similarities or changes related to simple, scientific ideas and processes.</li> <li>• Use straightforward, scientific evidence to answer questions or to support their findings.</li> </ul>	<ul style="list-style-type: none"> <li>• Use test results to make predictions to set up further comparative and fair tests.</li> <li>• Use simple models to describe scientific ideas, identifying scientific evidence that has been used to support or refute ideas or arguments.</li> </ul>
Biology	To understand plants	<ul style="list-style-type: none"> <li>• Identify and name a variety of common plants, including garden plants, wild plants and trees and those classified as deciduous and evergreen.</li> <li>• Identify and describe the basic structure of a variety of common flowering plants, including roots, stem/trunk, leaves and flowers.</li> <li>• Observe and describe how seeds and bulbs grow into mature plants.</li> <li>• Find out and describe how plants need water, light and a suitable temperature to grow and stay healthy.</li> </ul>	<ul style="list-style-type: none"> <li>• Identify and describe the functions of different parts of flowering plants: roots, stem, leaves and flowers.</li> <li>• 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.</li> <li>• Investigate the way in which water is transported within plants.</li> <li>• Explore the role of flowers in the life cycle of flowering plants, including pollination, seed formation and seed dispersal.</li> </ul>	<ul style="list-style-type: none"> <li>• <i>Relate knowledge of plants to studies of evolution and inheritance.</i></li> <li>• <i>Relate knowledge of plants to studies of all living things.</i></li> </ul>
	To understand animals and humans	<ul style="list-style-type: none"> <li>• Identify and name a variety of common animals that are birds, fish, amphibians, reptiles, mammals and invertebrates.</li> <li>• Identify and name a variety of common animals that are carnivores, herbivores and omnivores.</li> <li>• Describe and compare the structure of a variety of common animals (birds, fish, amphibians, reptiles, mammals and invertebrates, including pets).</li> </ul>	<ul style="list-style-type: none"> <li>• Identify that animals, including humans, need the right types and amounts of nutrition, that they cannot make their own food and they get nutrition from what they eat.</li> <li>• Construct and interpret a variety of food chains, identifying producers, predators and prey.</li> </ul>	<ul style="list-style-type: none"> <li>• Describe the changes as humans develop to old age.</li> <li>• Identify and name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood.</li> <li>• Recognise the importance of diet, exercise, drugs and lifestyle on the way the human body functions.</li> </ul>

	<ul style="list-style-type: none"> <li>• Identify name, draw and label the basic parts of the human body and say which part of the body is associated with each sense.</li> <li>• Notice that animals, including humans, have offspring which grow into adults.</li> <li>• Investigate and describe the basic needs of animals, including humans, for survival (water, food and air).</li> <li>• Describe the importance for humans of exercise, eating the right amounts of different types of food and hygiene.</li> <li>• Describe and compare the structure of a variety of common animals.</li> </ul>	<ul style="list-style-type: none"> <li>• Identify that humans and some animals have skeletons and muscles for support, protection and movement.</li> <li>• Describe the simple functions of the basic parts of the digestive system in humans.</li> <li>• Identify the different types of teeth in humans and their simple functions.</li> </ul>	<ul style="list-style-type: none"> <li>• Describe the ways in which nutrients and water are transported within animals, including humans.</li> </ul>
To investigate living things	<ul style="list-style-type: none"> <li>• Explore and compare the differences between things that are living, that are dead and that have never been alive.</li> <li>• 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.</li> <li>• Identify and name a variety of plants and animals in their habitats, including micro-habitats.</li> <li>• 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.</li> </ul>	<ul style="list-style-type: none"> <li>• Recognise that living things can be grouped in a variety of ways.</li> <li>• Explore and use classification keys.</li> <li>• Recognise that environments can change and that this can sometimes pose dangers to specific habitats.</li> </ul>	<ul style="list-style-type: none"> <li>• Describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird.</li> <li>• Describe the life process of reproduction in some plants and animals.</li> <li>• Describe how living things are classified into broad groups according to common observable characteristics.</li> <li>• Give reasons for classifying plants and animals based on specific characteristics.</li> </ul>

	To understand evolution and inheritance	<ul style="list-style-type: none"> <li>• <i>Identify how humans resemble their parents in many features.</i></li> </ul>	<ul style="list-style-type: none"> <li>• <i>Identify how plants and animals, including humans, resemble their parents in many features.</i></li> <li>• <i>Recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago.</i></li> <li>• <i>Identify how animals and plants are suited to and adapt to their environment in different ways.</i></li> </ul>	<ul style="list-style-type: none"> <li>• Recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago.</li> <li>• Recognise that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents.</li> <li>• Identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution.</li> </ul>
Chemistry	To investigate materials	<ul style="list-style-type: none"> <li>• Distinguish between an object and the material from which it is made.</li> <li>• Identify and name a variety of everyday materials, including wood, plastic, glass, metal, water and rock.</li> <li>• Describe the simple physical properties of a variety of everyday materials.</li> <li>• Compare and group together a variety of everyday materials on the basis of their simple physical properties.</li> <li>• Find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching.</li> <li>• Identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick/rock, and paper/cardboard for particular uses.</li> </ul>	<p><b>Rocks and Soils</b></p> <ul style="list-style-type: none"> <li>• Compare and group together different kinds of rocks on the basis of their simple, physical properties.</li> <li>• Relate the simple physical properties of some rocks to their formation (igneous or sedimentary).</li> <li>• Describe in simple terms how fossils are formed when things that have lived are trapped within sedimentary rock.</li> <li>• Recognise that soils are made from rocks and organic matter.</li> </ul> <p><b>States of Matter</b></p> <ul style="list-style-type: none"> <li>• Compare and group materials together, according to whether they are solids, liquids or gases.</li> </ul>	<ul style="list-style-type: none"> <li>• Compare and group together everyday materials based on evidence from comparative and fair tests, including their hardness, solubility, conductivity (electrical and thermal), and response to magnets.</li> <li>• Understand how some materials will dissolve in liquid to form a solution and describe how to recover a substance from a solution.</li> <li>• Use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating.</li> <li>• Give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic.</li> </ul>

			<ul style="list-style-type: none"> <li>• Observe that some materials change state when they are heated or cooled, and measure the temperature at which this happens in degrees Celsius (°C), building on their teaching in mathematics.</li> <li>• Identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature.</li> </ul>	<ul style="list-style-type: none"> <li>• Demonstrate that dissolving, mixing and changes of state are reversible changes.</li> <li>• 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, oxidation and the action of acid on bicarbonate of soda.</li> </ul>
Physics	To understand movement, forces and magnets	<ul style="list-style-type: none"> <li>• <i>Notice and describe how things move, using simple comparisons such as faster and slower.</i></li> <li>• <i>Compare how different things move.</i></li> </ul>	<ul style="list-style-type: none"> <li>• Compare how things move on different surfaces.</li> <li>• Notice that some forces need contact between two objects, but magnetic forces can act at a distance.</li> <li>• Observe how magnets attract or repel each other and attract some materials and not others.</li> <li>• 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.</li> <li>• Describe magnets as having two poles.</li> <li>• Predict whether two magnets will attract or repel each other, depending on which poles are facing.</li> </ul>	<p><b>Magnets</b></p> <ul style="list-style-type: none"> <li>• Describe magnets as having two poles.</li> <li>• Predict whether two magnets will attract or repel each other, depending on which poles are facing.</li> </ul> <p><b>Forces</b></p> <ul style="list-style-type: none"> <li>• Explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object.</li> <li>• Identify the effect of drag forces, such as air resistance, water resistance and friction that act between moving surfaces.</li> <li>• <i>Describe, in terms of drag forces, why moving objects that are not driven tend to slow down.</i></li> <li>• <i>Understand that force and motion can be transferred through mechanical devices such as gears, pulleys, levers and springs.</i></li> </ul>

			<ul style="list-style-type: none"> <li>• Understand that some mechanisms including levers, pulleys and gears, allow a smaller force to have a greater effect.</li> </ul>
To understand light and seeing	<ul style="list-style-type: none"> <li>• <i>Observe and name a variety of sources of light, including electric lights, flames and the Sun, explaining that we see things because light travels from them to our eyes.</i></li> </ul>	<ul style="list-style-type: none"> <li>• Recognise that they need light in order to see things and that dark is the absence of light.</li> <li>• Notice that light is reflected from surfaces.</li> <li>• Recognise that light from the sun can be dangerous and that there are ways to protect their eyes.</li> <li>• Recognise that shadows are formed when the light from a light source is blocked by a solid object.</li> <li>• Find patterns in the way that the size of shadows change.</li> </ul>	<ul style="list-style-type: none"> <li>• Understand that light appears to travel in straight lines.</li> <li>• Use the idea that light travels in straight lines to explain that objects are seen because they give out or reflect light into the eyes.</li> <li>• Use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them, and to predict the size of shadows when the position of the light source changes.</li> <li>• 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.</li> </ul>
To investigate sound and hearing	<ul style="list-style-type: none"> <li>• <i>Observe and name a variety of sources of sound, noticing that we hear with our ears.</i></li> </ul>	<ul style="list-style-type: none"> <li>• Identify how sounds are made, associating some of them with something vibrating.</li> <li>• Recognise that vibrations from sounds travel through a medium to the ear.</li> </ul>	<ul style="list-style-type: none"> <li>• Find patterns between the pitch of a sound and features of the object that produced it.</li> <li>• Find patterns between the volume of a sound and the strength of the vibrations that produced it.</li> <li>• Recognise that sounds get fainter as the distance from the sound source increases.</li> </ul>
To understand electrical circuits	<ul style="list-style-type: none"> <li>• <i>Identify common appliances that run on electricity.</i></li> <li>• <i>Construct a simple series electrical circuit.</i></li> </ul>	<ul style="list-style-type: none"> <li>• Identify common appliances that run on electricity.</li> <li>• Construct a simple series electrical circuit, identifying and naming its basic parts,</li> </ul>	<ul style="list-style-type: none"> <li>• Associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit.</li> </ul>

			<p>including cells, wires, bulbs, switches and buzzers.</p> <ul style="list-style-type: none"> <li>• 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.</li> <li>• Recognise that a switch opens and closes a circuit and associate this with whether or not a lamp lights in a simple series circuit.</li> <li>• Recognise some common conductors and insulators, and associate metals with being good conductors.</li> </ul>	<ul style="list-style-type: none"> <li>• 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.</li> <li>• Use recognised symbols when representing a simple circuit in a diagram.</li> </ul>
To understand the Earth's movement in space	<ul style="list-style-type: none"> <li>• <i>Observe the apparent movement of the Sun during the day.</i></li> <li>• Observe changes across the four seasons.</li> <li>• Observe and describe weather associated with the seasons and how day length varies.</li> </ul>	<ul style="list-style-type: none"> <li>• <i>Describe the movement of the Earth relative to the Sun in the solar system.</i></li> <li>• <i>Describe the movement of the Moon relative to the Earth.</i></li> </ul>	<ul style="list-style-type: none"> <li>• Describe the movement of the Earth, and other planets, relative to the Sun in the solar system.</li> <li>• Describe the movement of the Moon relative to the Earth.</li> <li>• Describe the Sun, Earth and Moon as approximately spherical bodies.</li> <li>• Use the idea of the Earth's rotation to explain day and night and the apparent movement of the sun across the sky.</li> </ul>	
Note:	Items in italics are not statutory in the English National Curriculum.			

Within each Milestone children are identified at working within the cognitive domains of Basic, Advancing or Deep relating to the level of independent working and depth of learning. Pupils' work will be constantly monitored and assessed using a variety of methods including:

- Observing pupils at work, as individuals and in a group.
- Questioning, talking and listening to pupils.
- Considering material produced by pupils and discussing these with them.

## 6. **Inclusion**

The school aims to encourage all pupils to reach their full potential through provision of varied opportunities. We recognise that our curriculum planning must allow pupils to gain a progressively deeper understanding and competency as they move through our school.

We recognise that some children will move beyond any particular level and that others will need extra support. Pupils with special education needs will work on the same topics at different rates and levels through open ended tasks matched to individual abilities and needs. Exceptionally able pupils will be given differentiated tasks, which will enable them to tackle more complex issues and understand more difficult concepts. The school SENCO further supports this process.

All children will be given equal access to Science irrespective of social class, gender, culture, race, disability, or learning difficulties. Respect and tolerance for all cultures will be promoted through the study of Science.

## 7. **Resources**

Science resources are stored in the large cupboard opposite Reception and Nursery.

We also loan resources from William Howard where possible.

The subject leader must be informed of any changes regarding science resources i.e missing or broken resources and/or when new or replacement resources are required.

## 8. **Health and Safety**

In order to access and benefit from the entire Science curriculum, pupils must feel safe within the classroom and around school. This can be monitored through all staff following health and safety procedures of the school.

When organising and undertaking trips outside of the school grounds, risk assessments are undertaken, pre-visits are made and first aid kits alongside pupils emergency contact details and medical information are carried at all times.

When handling materials, pupils will be observed washing their hands before and after handling as well as being aware of any allergies which could be triggered.

## 9. **Extra-Curricular Activities**

In accordance with our scientific topics, school trips are undertaken to encourage the pupils' curiosity and questioning as well as allowing the pupils' to learn in a different setting. Speakers and other Scientific specialists are also invited into school to boost the pupils learning and enthusiasm for the subject.

Parents and children are encouraged to research and further learning outside of school through tasks sent home from school or through day trips undertaken as a family.

#### 10. **Staff Development and Training Opportunities**

The Head and science subject leader will oversee the daily running of the school system, and further develop the expertise of all staff through training sessions and classroom support. The Head teacher and the science subject leader will assess and address staff training needs as part of the annual development plan process or in response to individual needs and requests throughout the year. Individual teachers should attempt to continually develop their own skills and knowledge, identify their own needs and notify the science subject leader of attendance at courses etc.