Ashbury Meadow Primary School.

Science Curriculum Policy March 2015

Scientific Understanding

A high-quality science education provides the foundations for understanding the world through the specific disciplines of biology, chemistry and physics. Science has changed our lives and is vital to the world's future prosperity, and all pupils should be taught essential aspects of the knowledge, methods, processes and uses of science. 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. They should be encouraged to understand how science can be used to explain what is occurring, predict how things will behave, and analyse causes.

Curriculum aims

This area of learning contributes to the achievement of the curriculum aims for all young people 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
- become equipped with the scientific knowledge required to understand the **uses and implications** of science, today and for the future.

Why is this area of learning important?

The programmes of study describe a sequence of knowledge and concepts. While it is important that pupils make progress, it is also vitally important that they develop secure understanding of each key block of knowledge and concepts in order to progress to the next stage. Insecure, superficial understanding will not allow genuine progression: pupils may struggle at key points of transition (such as between primary and secondary school), build up serious misconceptions, and/or have significant difficulties in understanding higher-order content.

Pupils should be able to describe associated processes and key characteristics in common language, but they should also be familiar with, and use, technical terminology accurately and precisely. They should build up an extended specialist vocabulary. They should also apply their mathematical knowledge to their understanding of science, including collecting, presenting and analysing data. The social and economic implications of science are important but, generally, they are taught most appropriately within the wider school curriculum: teachers will wish to use different contexts to maximise their pupils' engagement with and motivation to study science.

1. Essential knowledge

By the end of each key stage, pupils are expected to know, apply and understand the matters, skills and processes specified in the relevant programme of study.

Schools are not required by law to teach the example content in [square brackets] or the content indicated as being 'non-statutory

The national curriculum for science reflects the importance of spoken language in pupils' development across the whole curriculum – cognitively, socially and linguistically. The quality and variety of language that pupils hear and speak are key factors in developing their scientific vocabulary and articulating scientific concepts clearly and precisely. They must be assisted in making their thinking clear, both to themselves and others, and teachers should ensure that pupils build secure foundations by using discussion to probe and remedy their misconceptions.

2. Key skills

'Working scientifically' specifies the understanding of the nature, processes and methods of science for each year group. It should not be taught as a separate strand. The notes and guidance give examples of how 'working scientifically' might be embedded within the content of biology, chemistry and physics, focusing on the key features of scientific enquiry, so that pupils learn to use a variety of approaches to answer relevant scientific questions. These types of scientific enquiry should include: observing over time; pattern seeking; identifying, classifying and grouping; comparative and fair testing (controlled investigations); and researching using secondary sources. Pupils should seek answers to questions through collecting, analysing and presenting data.

Key skills and all programmes of study will be delivered through topics covered in the Rising Star Scheme

3. Breadth of learning

<table>
<tr><th colspan="5">Key Features</th></tr>
<tr><td rowspan="2">YEAR 1</td><td>PLANTS</td><td>ANIMALS (including Humans)</td><td>EVERYDAY MATERIALS</td><td>SEASONAL CHANGES</td></tr>
<tr><td>Identification and labelling, including trees
Structure of plants, including roots, stem, flower, etc.</td><td>Identification and labelling a variety of common animals (fish, amphibians, reptiles, birds and mammals)
Know carnivores, herbivores and omnivores
How to care for pets
Name parts of the human body</td><td>Identify and name a range of materials (wood, plastic, glass, metal, water and rock;
Classifying and Grouping according to a range of physical properties</td><td>Features of day and night including temperature
Weather, associated with seasons</td></tr>
<tr><td rowspan="2">Possible Learning Challenges</td><td></td><td>Why are humans not like tigers?</td><td rowspan="2">Which materials should the Three Little Pigs have used to build their house? or

What do Aliens think of life on planet Earth?</td><td rowspan="2">Why does it get darker earlier in winter? or

How do the seasons impact on what we do?</td></tr>
<tr><td colspan="2">Which birds and plants would Little Red Riding Hood find in our park?</td></tr>
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Key Features				
YEAR 2	**PLANTS**	**LIVING THINGS and their HABITATS**	**ANIMALS (including Humans)**	**Uses of Everyday Materials**
	What plants and seeds need to grow Growing from seeds and bulbs	Habitats Living and non living things Early Food Chains	Exercise and healthy living What animals and humans need to survive Animals have offspring, which grow to be adults	Use of different everyday materials Classifying and grouping Changing materials by bending, etc.
Possible Learning Challenges	**How can we grow our own salad? or** **How can you be the next master chef?**	**Why would a dinosaur not make a good pet?**	**How will 5 a day help me to be healthy? or** **How could you be the next Jessica Ennis or Steven Gerrard ?**	**What is our school made of? or** **Which materials did they use to build the Trafford Centre?**

	ANIMALS (including Humans)	PLANTS	LIGHT	FORCES and MAGNETS	ROCKS
YEAR 3	Nutrition, linked to what we eat Skeletons and muscles	Function of different parts of plants What different plants need to flourish Journey of the food in a plant Life cycle of a plant	Sources, including the Sun Protecting eyes from the Sun Shadows Reflection /mirrors	How magnets attract/repel some materials Magnetic poles Friction	How rocks are formed Different kinds of rocks Fossils Soil
Possible Learning Challenges	**How can Usain Bolt move so quickly?**	**How did that blossom become an apple?**	**How far can you throw your shadow?**	**Are you attractive enough?**	**What do rocks tell us about the way the Earth was formed?**

	ANIMALS, including Humans	LIVING THINGS and their Habitats	STATES OF MATTER	ELECTRICITY	SOUND
YEAR 4	Digestive System Teeth Food chains Predators and prey	Identify and name a variety of living things (plants and animals) in the local and wider environment and group them Recognise that environments can change and can pose dangers	Solids, Liquids and Gases Heating and cooling (no baking, etc.) Evaporation and condensation	Identify common appliances Construct simple circuits including switches Common conductors and insulators Alternative sources of energy	Sources Vibration Loud and faint Pitch Volume Sound travelling
Possible Learning Challenges	**What happens to the food we eat?**	**Which wild animals and plants thrive in your locality?**	**How would we survive without water?**	**How could we cope without electricity for one day?**	**Why is the sound that 'One Direction' makes enjoyed by so many?**

	LIVING THINGS and their Habitats	ANIMALS, including Humans	PROPERTIES & changes of materials	EARTH and SPACE	FORCES
YEAR 5	Life cycles of plants and animals Birth, growth, development and reproduction	Changes as humans develop from birth to old age	Dissolving Evaporating Filtering Reversible and Irreversible changes	Earth relative to the Sun Moon relative to the Earth Relationship between Sun, Earth and Moon Earth's rotation Day and night	Gravity Air Resistance Water Resistance Friction Gears, Pulleys, Leavers and Springs
Possible Learning Challenges	**Do all animals and plants start life as an egg?**	**How different will you be when you are as old as your grandparents ?**	**Could you be the next CSI investigator?**	**Will we ever send another human to the moon?**	**Can you feel the force?**

	LIVING THINGS and their Habitats	ANIMALS, including Humans	EVOLUTION and INHERITANCE	LIGHT	ELECTRICITY
YEAR 6	Classification of living things Vertebrates and invertebrates Classifying reptiles, amphibians, mammals, insects, etc.	Circulatory system Heart, blood vessels Diet, exercise and drugs Transport of nutrients through the body	Fossils tell us about the past Off spring Changes to the human skeleton over time Darwin	How light travels The eye Shadows	Electrical circuits (series) Designing traffic lights
Possible Learning Challenges	**Could Spiderman really exist?**	**What would a journey through your body be like?**	**Have we always looked like this?**	**How can you light up your life?**	**Could you be the next Nintendo apprentice?**

4. Curriculum Progression

EARLY PHASE

The principal focus of science teaching in key stage 1 is to enable pupils to experience and observe phenomena, looking more closely at the natural and humanly-constructed world around them. They should be encouraged to be curious and ask questions about what they notice. They should be helped to develop their understanding of scientific

ideas by using different types of scientific enquiry to answer their own questions, including observing changes over a period of time, noticing patterns, grouping and classifying things, carrying out simple comparative tests, and finding things out using secondary sources of information. They should begin to use simple scientific language to talk about what they have found out and communicate their ideas to a range of audiences in a variety of ways. Most of the learning about science should be done through the use of first-hand practical experiences, but there should also be some use of appropriate secondary sources, such as books, photographs and videos.

'Working scientifically' is described separately in the programme of study, but must **always** be taught through and clearly related to the teaching of substantive science content in the programme of study. Throughout the notes and guidance, examples show how scientific methods and skills might be linked to specific elements of the content.

Pupils should read and spell scientific vocabulary at a level consistent with their increasing word reading and spelling knowledge at key stage 1

KEY STAGE 2

MIDDLE PHASE

The principal focus of science teaching in lower key stage 2 is to enable pupils to broaden their scientific view of the world around them. They should do this through exploring, talking about, testing and developing ideas about everyday phenomena and the relationships between living things and familiar environments, and by beginning to develop their ideas about functions, relationships and interactions. They should ask their own questions about what they observe and make some decisions about which types of scientific enquiry are likely to be the best ways of answering them, including observing changes over time, noticing patterns, grouping and classifying things, carrying out simple comparative and fair tests and finding things out using secondary sources of information. They should draw simple conclusions and use some scientific language, first, to talk about and, later, to write about what they have found out. 'Working scientifically' is described separately at the beginning of the programme of study, but must **always** be taught through and clearly related to substantive science content in the programme of study. Throughout the notes and guidance, examples show how scientific methods and skills might be linked to specific elements of the content.

Pupils should read and spell scientific vocabulary correctly and with confidence, using their growing word reading and spelling knowledge.

LATER PHASE

The principal focus of science teaching in upper key stage 2 is to enable pupils to develop a deeper understanding of a wide range of scientific ideas. They should do this through exploring and talking about their ideas; asking their own questions about scientific phenomena; and analysing functions, relationships and interactions more systematically. At upper key stage 2, they should encounter more abstract ideas and

begin to recognise how these ideas help them to understand and predict how the world operates. They should also begin to recognise that scientific ideas change and develop over time. They should select the most appropriate ways to answer science questions using different types of scientific enquiry, including observing changes over different periods of time, noticing patterns, grouping and classifying things, carrying out comparative and fair tests and finding things out using a wide range of secondary sources of information. Pupils should draw conclusions based on their data and observations, use evidence to justify their ideas, and use their scientific knowledge and understanding to explain their findings.

'Working and thinking scientifically' is described separately at the beginning of the programme of study, but must **always** be taught through and clearly related to substantive science content in the programme of study. Throughout the notes and guidance, examples show how scientific methods and skills might be linked to specific elements of the content.

5. Cross-curricular studies

Children will have opportunities to develop their scientific skills through a range of subjects including, numeracy, literacy, computing and topic lessons.
Particularly in computing this will enhance the development of enquiry skills through the use of data handling techniques in the collection, recording, analysis and presentation of data and information.
Children will have the opportunity to use netbooks and I-pads to develop their scientific skills in a cross curricular manner.

6. Assessment and recording of progress

The children will be assessed at the beginning and end of topics, using the Rising star assessments. At the end of each topic the teacher will make a summative judgement about the attainment of each child recording whether they have yet to meet, have met of have exceeded the topic objectives.