Curriculum rationale:

The National Curriculum for Science aims to ensure that all pupils:

- Develop scientific knowledge and conceptual understanding through the specific disciplines of biology, chemistry and physics
- Develop an 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 in the future.

What are the main drivers of the Haringey Primary Science Curriculum?

Scope, sequencing, coherence and rigour are the four key principles that underpin the Haringey Primary Science curriculum. These principles ensure our curriculum is accessible for all children and maximises their progression.

Scope:

We follow the National Curriculum for science and 6 topics are studied per year. At its core our science curriculum prioritises pupils' comprehension and application of scientific concepts, so they can use them to make sense of the modern world. We ensure opportunities are provided to demonstrate understanding through application to formal knowledge as well as in informal, everyday experience. We emphasise the significant contributions to science made by scientists from diverse backgrounds.

Appropriate sequencing and coherence have taken into account the substantive knowledge and disciplinary skill pupils need to learn, before carrying out investigations. To this end, progression through disciplinary knowledge is mapped out within the substantive knowledge curriculum map. In science, this largely refers to the working scientifically aspect of the programme of study and includes: observing over time; pattern seeking; identifying, classifying and grouping; comparative and fair testing (controlled investigations), drawing conclusions and evaluating.

Sequence:

Units have been sequenced based on the most effective connections between topics within and across the scientific disciplines of Biology, Chemistry and Physics. Careful progression and sequencing of substantive and disciplinary knowledge over time support the hierarchical nature of science. Progression maps for each unit make explicit the links to relevant prior or upcoming learning. Progression through working scientifically skills are also mapped out. Within this layered approach, pupils are also guided from concrete to abstract concepts to develop schema. Regular retrieval, formative and cumulative assessment are built into the framework.

Coherence:

Links to other subject areas are made explicit as well as an emphasis on some of the wider ideas that cut across the disciplines of Science, Technology, Engineering and Maths (STEM).

Rigour:

To achieve depth, our curriculum includes the 'hinterland' facts and ideas needed to help pupils develop understanding. Whilst the curriculum is accessible for all, it is also appropriately challenging to achieve mastery. Misconceptions are tackled, including within the development of scientific theories into accepted ideas by the scientific community over time.

How does the HEP science curriculum develop Literacy?

Research by Beck, McKeown, and Kucan (2002) has shown that pupil literacy is the strongest predictor of science attainment. The HEP Science curriculum supports all pupils to access new information and effectively communicate their ideas in a variety of contexts.

How does the HEP science curriculum develop SMSC?

Spiritual:

The science curriculum aims to inspire awe and wonder as pupils relate to and make sense of the world around them. From the uniqueness of individual genetic makeup to the scale of the vastness of the universe. As pupils navigate the Big Ideas of science, they move from the concrete to the abstract and learn that everything is connected in our physical world and beyond. In doing so, we also learn to accept that science cannot provide all the answers and imagination and creativity can lead to new discoveries.

Moral:

Some scientific advancements have had a positive effect on our world as a whole. Others have had a negative, even catastrophic impact on us and our environment and atmosphere. Moral decisions and discussion around these topics are an important part of the decision-making process pupils will use as they navigate their world. To be accepted, based and without prejudice. Modelling this through text, tasks and discussion encourages pupils to be open to a range of ideas and consider them from an informed, critical perspective.

Social:

Much of the success of science depends on the input and feedback from other scientists to develop a shared understanding and evaluate data to make it more trustworthy. Working scientifically often depends on collaborative tasks and sharing of findings. As pupils build a greater understanding of science, it allows them to deepen their everyday social experiences and to better appreciate the positive and negative social impact of science in their homes, communities and our world.

Cultural:

Pupils have opportunities to research the work of scientists from different backgrounds and examine how they have shaped our lives. Relevant topical issues are regularly taught and discussed. Pupils also make use of the environment around them, particularly when studying plants and animals. Historically and currently, science relies on contributions from around the world. Pupils appreciate the importance of acceptance from the scientific community and the shared standards that must be met before use by citizens. Pupils should experience a sense of enjoyment as they learn about themselves, others and the world around them.

Appendix 1 - Summary of National curriculum for science at key stage 1 and 2:

KEY STAGE 1:

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 Lower Key Stage 2 – Years 3 & 4:

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.

Upper Key Stage 2 – Years 5 & 6:

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.

Pupils should read, spell and pronounce scientific vocabulary correctly.

NOTE:

As part of our science curriculum for Year 5, lessons cover human reproduction and puberty. These lessons address physical and emotional changes that occur as part of growth and development in an anatomical, factual manner suitable for 10-11 year olds. As these topics fall under the statutory National Science Curriculum, parents/carers are unable to withdraw their child from attending these lessons.

Appendix 1 - Key stage 2 Science curriculum map:

Year	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
3	**Plants** Parts of plants, needs of plants and their life cycle.	**Rocks** Comparing different rocks, fossils, soil formation	**Light** Light sources, how light is reflected off objects, how shadows form, changing shadows, eye protection	**Animals including humans** Nutrition, Musculoskeletal system for support, movement, and protection	**Forces and magnets** Non-contact forces, attraction and repulsion of magnets, magnetic materials and the N and S pole of magnets	**Bee project** A look at the relationship between bees and their environment; importance in pollination, food and other resource.
4	**States of matter/ solids, liquids and gases** Group materials based on their properties, changes of state, heating and cooling, the water cycle	**Animals including humans** Eating, teeth, digestive system and food chains, producers, predators and prey.	**Sound** Making sounds, vibrations, the ear, changes in pitch and volume	**Living things and their habitats** Classification, characteristics, and the effects of environmental changes	**Electricity** Appliances, building circuits and identifying components, circuit diagnostics, conductors and insulators	**The History of Science** This unit focuses on the development of scientific theories by a diverse range of scientists and inventors, both historical and contemporary.

5	**Properties and changes of materials** Classifying materials, Dissolving, separating and changes of state, uses of materials, reversible and irreversible changes	**Animals including humans** Life cycles, plant and animal reproduction, human life cycle	**Forces** Gravity, air resistance, water resistance and friction between moving surfaces, multiplying forces using levers, pulleys and gears	**Living things and their habitats** Classifying living things, Life cycles of mammals, amphibians, insects and birds	**Earth and space** The movement of Earth, other planets and the Moon in relation to the Sun and each other, spherical bodies, night and day	**The Scientific Method** The unit looks at the steps that scientists follow when thinking about a problem and how to solve it.
6	**Animals including humans** The circulatory system, lifestyle, health and disease; transport of water in animals	**Science of Light** How light travels, how we see objects, the shape of shadows	**Electric Circuits** The effects of changing the number and voltage of cells in a circuit; varying the function of components; representing circuits using symbols	**Evolution and inheritance** What we learn by looking at fossils; variation, reproduction and adaptation. Evolution	**Classifying Living Things** Classifying microorganisms, plants and animals	**Transition Unit** Introduction to cell biology, energy forms and transformations, properties of materials, forces, and basic principles of chemical reactions.