4. Science Curriculum Intent, Implementation and Impact

Strategic intent

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

- 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

We offer a structure and sequence of lessons to help teachers ensure they have covered the skills required to meet the aims of the national curriculum. The intent is to ensure all pupils develop a curiosity and interest in the sciences and are able to enquire for themselves.

When planning for the science curriculum we use a discovery/enquiry based approach where children hypothesize/enquire, investigate, evaluate and include. We intend for children to have the opportunity, wherever possible, to learn through varied systematic investigations, leading to them being equipped for life to ask and answer scientific questions about the world around them. It will develop the natural curiosity of the child, encourage respect for living organisms and the physical environment and provide opportunities for critical evaluation of evidence As children progress through the key stages, they build on their skills in working scientifically, as well as on their scientific knowledge, as they develop greater independence in planning and carrying out fair and comparative tests to answer a range of scientific questions. Work planned ensures that children have a varied, progressive and well-mapped-out science curriculum that provides the opportunity for progression across the full breadth of the science national curriculum for KS1 and KS2. This progression grid can support any subject leader or teacher of science to ensure progression of skills and knowledge. End points of our curriculum are deemed to be at the end of Key Stage 2. We intend to build a Science curriculum which develops learning and results in the acquisition of knowledge and build a Science curriculum which, enables children to become enquiry based learners

Implementation

Content and Sequence

At Hanging Heaton we have a clear and comprehensive scheme of work in line with the National Curriculum where teaching and learning should show progression across all key stages within the strands of science. The acquisition of key scientific knowledge is an integral part of our science lessons. The progression of skills for working scientifically are developed through the classes and scientific enquiry skills are of key importance within lessons. The progression of these skills is set out in the science Progression Map. Each lesson has a clear focus, whether it be content based or enquiry based.

Scientific knowledge and enquiry skills are developed with increasing depth and challenge as children move through the year groups/classes. They complete regular investigations and hands-on activities while gaining the scientific knowledge for each unit, through the use of different teaching styles such as concrete, pictorial and auditory. Scientific enquiry is to be planned into science lessons on a regular basis within each unit of work, with the aim of at least two enquiry based activities each half term. Children are to develop these skills progressively and revise these skills regularly. This can be evidenced in a variety of ways such as photographs, observations and our agreed investigating sheets. Children will use a range of resources to develop their knowledge and understanding that is integral to their learning and develop their understanding of working scientifically. Teachers assess children's levels of understanding at various points in the lesson. They also enable opportunities to recap concepts where necessary and children will reflect on previous learning and cross curricular links will be made wherever possible. The sequence of lessons helps to embed scientific knowledge and skills, with each lesson building on previous learning. Children will be able to build on prior knowledge and link ideas together, enabling them to question and become enquiry based learners. There is also the opportunity to regularly review and evaluate children's understanding. Activities are effectively differentiated so that all children have an appropriate level of support and challenge. We have suggested a specific skills set for each class and all objectives are covered by the end of each key stage, which will offer structure and narrative and which can be found on the Science Progression Map. They are by no means to be used exclusively, but can be used to support planning and allow teachers to see what previous learning has taken place, what learning needs to be covered now and address any gaps in knowledge and misconceptions and where the learning will ultimately take them by the end of the key stage.

Impact

In Science, progress is measured through a child's ability to know more, remember more and explain more. Children will: retain knowledge that is pertinent to Science with a real life context, be able to question ideas and reflect on knowledge, work collaboratively and practically to investigate and experiment, be able to explain the process they have taken and be able to reason scientifically. This can be measured in different ways in our topics. Attainment and progress can be measured across the school using our assessment spreadsheets. The impact of using the full range of resources included in the science unit will also be seen across the school with an increase in the profile of science. The learning environment across the school will be more consistent with science technical vocabulary spoken and used by all learners. Children who feel confident in their science knowledge and enquiry skills will be excited about science, show that they are actively curious to learn more and will see the relevance of what they learn in science lessons to real-life situations and also the importance of science in the real world. Most children will achieve age related expectations in Science at the end of their key stage. End points of our curriculum are deemed to be at the end of Key Stage 2 and impact over the last few years can be seen overleaf.

2017				2018				2019			
KS1		KS2		KS1		KS2		KS1		KS2	
EXS (%)	GSD (%)	EXS (%)	GSD (%)	EXS (%)	GSD (%)	EXS (%)	GSD (%)	EXS (%)	GSD (%)	EXS (%)	GSD (%)
95	10	100	25	90	24	100	35	94	18	95	19

Nearly all children leave Hanging Heaton CE (VC) J&I School having achieved at least the expected standard with some also going on to achieve a greater depth within the standard.

SEND children make at least expected progress and reach their attainment targets.

Disadvantaged children make progress that is in line with their peers.

Children leave Hanging Heaton VC (CE) J&I School with a positive attitude towards Science.

4.1 Science Progression Map- Scientific Enquiry

EYFS	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	YEAR 6
Choose the resources they need for their chosen activities and say when they do or don't need help Know about similarities and differences in relation to places, objects, materials and living things Make observations of animals and plants Explore a variety of materials, tools and techniques, experimenting with colour, design, texture, form and function. Select and use technology for particular purposes represent their own ideas, thoughts and feelings through design and technology, art, music, dance, role play and stories Talk about the features of their own immediate environment and how environments might vary from one another ¬ Explain why some things occur and talk about changes	Talk about what they <see, touch, smell, hear or taste> Use simple equipment to help make observations Perform a simple test Tell other people about what they have done Identify and classify things they observe Think of some questions to ask Explain what has been found out Show their work using pictures, labels and captions Record findings using standard units Put some information in a chart or table	Use some science words to describe what they have seen and measured Ask people questions and use secondary sources to find answers Observe closely, using simple equipment Say whether things happened as they expected Organise things into groups Find simple patterns (or associations) Identify animals and plants by a specific criteria, for example, lay eggs or not; have feathers or not Use (text, diagrams, pictures, charts, tables) to record their observations Perform simple tests Suggest how, and use prompts, to find things out	Use different ideas and suggest how to find something out Plan a fair test and explain why it was fair Set up simple practical enquiries, comparative and fair tests Explain why they need to collect information to answer a question Make systematic and careful observations and, where appropriate, take accurate measurements using standard units Record their observations in different ways, for example, labelled diagrams, charts etc. Explain what they have found out and use their measurements to say whether it helps to answer their question Use a range of equipment, (including a thermometer and data-logger	Ask relevant questions and use different types of scientific enquiries to answer them Set up simple practical enquiries, comparative and fair tests Decide which information needs to be collected and decide which is the best way for collecting it Take measurements using different equipment and units of measure and record what they have found in a range of ways Make accurate measurements using standard units Explain their findings in different ways, for example, display, presentation, writing Using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions Make predictions based on something they have found out Record and present what they have found using scientific language, drawings, labelled diagrams, keys, bar charts and tables	Plan different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary Take measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate Record data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs Use test results to make predictions to set up further comparative and fair tests Report and present findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations Identify scientific evidence that has been used to support or refute ideas or arguments.	Plan different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary Take measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate Record data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs Use test results to make predictions to set up further comparative and fair tests Report and present findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations Identify scientific evidence that has been used to support or refute ideas or arguments

4.2 Science Progression Map- Biology

Class 1	Class 2	Class 3	Class 4	Class 5
Animals, including humans Can talk about some of the animals, humans and birds they have observed. •Can find own parts of the body and can name some. •Can name some animals and talk about some of their simple features. Point out some of the differences between different animals **•Classify common animals (birds, fish, amphibians, reptiles, mammals)** **•Describe how an animal is suited to its environment** **•Name the parts of the human body that they can see** **•Classify animals by what they eat (carnivore, herbivore, omnivore)** **•Sort some animals by body covering, for example, scales, fur and skin** Plants Shows care and concern for living things and the environment. •Beginning to show understanding of growth, decay and changes over time **Name the petals, stem, leaf and root of a plant**	Animals, including humans Point out some of the differences between different animals •Classify common animals (birds, fish, amphibians, reptiles, mammals) •Name the parts of the human body that they can see •Sort some animals by body covering, for example, scales, fur and skin •Explain the differences between living and non-living things and things that have never been alive **Identify and name different sources of food.** **•Describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene.** **•Find out about and describe the basic needs of animals, including humans, for survival (water, food and air)** **•Notice that animals, including humans, have offspring which grow into adults** Plants •Name the petals, stem, leaf and root of a plant •Identify and name a range of common wild and garden plants and trees •Find out and describe how plants need water, light and a	Animas including humans Identify that animals, including humans, need the right types and amount of nutrition, •Understand that that they cannot make their own food; they get nutrition from what they eat •Identify that humans and some other animals have skeletons and muscles for support, protection and movement **Identify and describe the simple functions of the basic parts of the human digestive system** **•Describe the simple functions of the organs of the human digestive system** **•Identify the different types of human teeth and their simple functions** **•Recognise that environments can change and this can sometimes pose dangers to living things** Plants Identify and describe the functions of different parts of flowering plants, for example, 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 •Explore the part that flowers play in the life cycle of flowering Plants, including pollination, seed formation and seed dispersal.	Animals, including humans Identify and describe the simple functions of the basic parts of the human digestive system •Describe the simple functions of the organs of the human digestive system •Identify the different types of human teeth and their simple functions •Recognise that environments can change and this can sometimes pose dangers to living things **Describe the life process of reproduction in some plants and animals.** **Describe the changes as humans develop to old age.** Living things and their habitats Construct and interpret a variety of food chains, identifying producers, predators and prey. •Recognise that living things can be grouped in a variety of ways •Explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment **Describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird**	Animals, including humans Describe the life process of reproduction in some plants and animals. Describe the changes as humans develop to old age. **Identify and name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood** **•Recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function** **•Describe the ways in which nutrients and water are transported within animals, including humans.** **•Recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago** Living things and their habitats Describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird Evolution and inheritance **Recognise that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents** **•Identify how animals and plants are adapted to suit their**

•Identify and name a range of common wild and garden plants and trees	suitable temperature to grow and stay healthy. **Identify and name a variety of plants and animals in their habitats, including micro-habitats** **•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.** <u>Living things and their habitats</u> Describe how an animal is suited to its environment •Classify animals by what they eat (carnivore, herbivore, omnivore) **Describe how different habitats provide for the basic needs of different kinds of animals and plants, and how they depend on each other** **•Describe how different habitats provide for the basic needs of different kinds of animals and plants, and how they depend on each other** **•Describe how animals obtain their food from plants and other animals, using the idea of a simple food chain**	<u>Living things and their habitats</u> **Construct and interpret a variety of food chains, identifying producers, predators and prey.** **•Recognise that living things can be grouped in a variety of ways**		**environment in different ways and that adaptation may lead to evolution.**

4.3 Science Progression Map- Physics

Class 1	Class 2	Class 3	Class 4	Class 5
<u>Seasonal changes</u> They talk about the features of their own immediate environment and how environments might vary from one another through seasons. •Looks closely at patterns and change throughout the seasons. **Describe how an animal is suited to its environment** **•Observe changes across the four seasons** **•Observe and describe weather associated with the seasons and how day length varies**	<u>Seasonal changes</u> Describe how an animal is suited to its environment •Observe changes across the four seasons •Observe and describe weather associated with the seasons and how day length varies	<u>Light</u> Recognise that they need light in order to see things and that dark is the absence of light •Notice that light is reflected from surfaces •Recognise that light from the sun can be dangerous and that there are ways to protect their eyes •Recognise that shadows are formed when the light from a light source is blocked by a solid object •Find patterns in the way that the size of shadows change. <u>Sound</u> **Identify how sounds are made, associating some of them with something vibrating** **•Recognise that vibrations from sounds travel through a medium to the ear** **•Find patterns between the pitch of a sound and features of the object that produced it** **•Find patterns between the volume of a sound and the strength of the vibrations that produced it** **•Recognise that sounds get fainter as the distance from the sound source increases**	<u>Electricity</u> Identify common appliances that run on electricity •Construct a simple series electrical circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers •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 •Recognise that a switch opens and closes a circuit and associate this with whether or not a lamp lights in a simple series circuit Recognise some common conductors and insulators, and associate metals with being good conductors. **Associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit** **•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** **•Use recognised symbols when representing a simple circuit in a diagram.** <u>Earth and Space</u> **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**	<u>Earth and Space</u> 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. •Explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object Light **Recognise that light appears to travel in straight lines** **•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** **•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**

			•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.** **•Explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object** **•Identify the effects of air resistance, water resistance and friction, that act between moving surfaces** **Recognise that some mechanisms, including levers, pulleys and gears, allow a smaller force to have a greater effect.** <u>Forces</u> Compare how things move on different surfaces •Notice that some forces need contact between two objects, but magnetic forces can act at a distance •Observe how magnets attract or repel each other and attract some materials and not others •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 •Describe magnets as having two poles Predict whether two magnets will attract or repel each other, depending on which poles are facing.	**•Use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them.**

4.4 Science Progression Map- Chemistry

Class 1	Class 2	Class 3	Class 4	Class 5
<u>Every day materials</u> Talk about how things work and what they are made from. •Looks closely at similarities and differences between materials. **Describe materials using senses, using specific scientific words** **•Explain what material objects are made from** **•Explain why a material might be useful for a specific job** **•Name some different materials** **•Sort materials into groups by a given criteria**	<u>Use of every day materials</u> Describe materials using senses, using specific scientific words •Explain what material objects are made from •Explain why a material might be useful for a specific job •Name some different materials •Sort materials into groups by a given criteria **Identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses** **Find out how the shapes of solid objects made from some materials can be changed by squashing, bending, stretching and twisting**	<u>Rocks</u> Compare and group together different kinds of rocks on the basis of their appearance and simple physical properties •Describe in simple terms how fossils are formed when things that have lived are trapped within rock •Recognise that soils are made from rocks and organic matter. <u>States of matter</u> **Compare and group materials together, according to whether they are solids, liquids or gases** **•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 (°C)** **•Identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature.**	<u>States of matter</u> Compare and group materials together, according to whether they are solids, liquids or gases •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 •Identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature. <u>Properties and changes of materials</u> **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** **•Know that some materials will dissolve in liquid to form a solution** **•Describe how to recover a substance from a solution** **•Use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating** **•Give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday**	**<u>Properties and changes of materials</u>** 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 •Know that some materials will dissolve in liquid to form a solution •Describe how to recover a substance from a solution •Use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating •Give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials •Demonstrate that dissolving, mixing and changes of state are reversible changes •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.

			materials, including metals, wood and plastic **•Demonstrate that dissolving, mixing and changes of state are reversible changes** **•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.**	

4.5 Science Teaching Sequences by Class: Class 1

	Animals inc humans Term	Plants	Uses of materials Term	Seasonal Changes
Rec	•Can talk about some of the animals, humans and birds they have observed. •Can find own parts of the body and can name some. •Can name some animals and talk about some of their simple features. **Choose the resources they need for their chosen activities and say when they do or don't need help** **Make observations of animals and plants**	•Shows care and concern for living things and the environment. •Beginning to show understanding of growth, decay and changes over time. **Make observations of animals and plants** **Represent their own ideas, thoughts and feelings through design and technology, art, music, dance, role play and stories**	•Talk about how things work and what they are made from. •Looks closely at similarities and differences between materials. **Know about similarities and differences in relation to places, objects, materials and living things**	•They talk about the features of their own immediate environment and how environments might vary from one another through seasons. •Looks closely at patterns and change throughout the seasons. **Talk about the features of their own immediate environment and how environments might vary from one another** **Explain why some things occur and talk about changes**
Y1	•Point out some of the differences between different animals •Classify common animals (birds, fish, amphibians, reptiles, mammals) •Describe how an animal is suited to its environment •Name the parts of the human body that they can see •Classify animals by what they eat (carnivore, herbivore, omnivore) •Sort some animals by body covering, for example, scales, fur and skin **Use simple equipment to help make observations** **Tell other people about what they have done** **Identify and classify things they observe** **Perform a simple test**	•Name the petals, stem, leaf and root of a plant •Identify and name a range of common wild and garden plants and trees **Put some information in a chart or table** **Record findings using standard units** **Perform a simple test**	•Describe materials using senses, using specific scientific words •Explain what material objects are made from •Explain why a material might be useful for a specific job •Name some different materials •Sort materials into groups by a given criteria **Talk about what they <see, touch, smell, hear or taste>** **Show their work using pictures, labels and captions** **Perform a simple test**	•Describe how an animal is suited to its environment •Observe changes across the four seasons •Observe and describe weather associated with the seasons and how day length varies **Think of some questions to ask** **Explain what has been found out** **Perform a simple test**

4.6 Science Teaching Sequences by Class: Class 2

Class 2	Animals inc humans Term	Plants	Uses of materials Term	Living things and their habitats
Y1	•Point out some of the differences between different animals •Classify common animals (birds, fish, amphibians, reptiles, mammals) •Name the parts of the human body that they can see •Sort some animals by body covering, for example, scales, fur and skin •Explain the differences between living and non-living things and things that have never been alive **Use simple equipment to help make observations** **Tell other people about what they have done** **Identify and classify things they observe** **Perform a simple test**	•Name the petals, stem, leaf and root of a plant •Identify and name a range of common wild and garden plants and trees •Find out and describe how plants need water, light and a suitable temperature to grow and stay healthy. **Put some information in a chart or table** **Record findings using standard units** **Perform a simple test**	•Describe materials using senses, using specific scientific words •Explain what material objects are made from •Explain why a material might be useful for a specific job •Name some different materials •Sort materials into groups by a given criteria **Talk about what they <see, touch, smell, hear or taste>** **Show their work using pictures, labels and captions** **Perform a simple test**	•Describe how an animal is suited to its environment •Classify animals by what they eat (carnivore, herbivore, omnivore) Describe how an animal is suited to its environment •Observe changes across the four seasons •Observe and describe weather associated with the seasons and how day length varies **Think of some questions to ask** **Explain what has been found out** **Perform a simple test**
Y2	•Identify and name different sources of food. •Describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene. •Find out about and describe the basic needs of animals, including humans, for survival (water, food and air) •Notice that animals, including humans, have offspring which grow into adults **Observe closely, using simple equipment** **Identify animals and plants by a specific criteria, for example, lay eggs or not; have feathers or not** **Perform simple tests**	•Identify and name a variety of plants and animals in their habitats, including micro-habitats •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. **Say whether things happened as they expected** **Ask people questions and use secondary sources to find answers** **Perform simple tests**	•Identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses Find out how the shapes of solid objects made from some materials can be changed by squashing, bending, stretching and twisting **Use (text, diagrams, pictures, charts, tables) to record their observations** **Organise things into groups** **Find simple patterns (or associations)** **Perform simple tests**	•Describe how different habitats provide for the basic needs of different kinds of animals and plants, and how they depend on each other •Describe how different habitats provide for the basic needs of different kinds of animals and plants, and how they depend on each other •Describe how animals obtain their food from plants and other animals, using the idea of a simple food chain **Suggest how, and use prompts, to find things out** **Use some science words to describe what they have seen and measured** **Perform simple tests**

4.7 Science Teaching Sequences by Class: Class 3

Class 3	**Animals including humans**	**Plants**	**Light and sound - 1 term**	**Materials and their properties - 1 term**
Y3	•Identify that animals, including humans, need the right types and amount of nutrition, •Understand that that they cannot make their own food; they get nutrition from what they eat •Identify that humans and some other animals have skeletons and muscles for support, protection and movement **Use different ideas and suggest how to find something out** **Explain why they need to collect information to answer a question**	•Identify and describe the functions of different parts of flowering plants, for example, 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 •Explore the part that flowers play in the life cycle of flowering Plants, including pollination, seed formation and seed dispersal. **Use different ideas and suggest how to find something out** **Plan a fair test and explain why it was fair** **Make systematic and careful observations and, where appropriate, take accurate measurements using standard units**	•Recognise that they need light in order to see things and that dark is the absence of light •Notice that light is reflected from surfaces •Recognise that light from the sun can be dangerous and that there are ways to protect their eyes •Recognise that shadows are formed when the light from a light source is blocked by a solid object •Find patterns in the way that the size of shadows change. **Use different ideas and suggest how to find something out** **Set up simple practical enquiries, comparative and fair tests** **Record their observations in different ways, for example, labelled diagrams, charts etc.**	•Compare and group together different kinds of rocks on the basis of their appearance and simple physical properties •Describe in simple terms how fossils are formed when things that have lived are trapped within rock •Recognise that soils are made from rocks and organic matter. **Use different ideas and suggest how to find something out** **Use a range of equipment, (including a thermometer and data-logger** **Explain what they have found out and use their measurements to say whether it helps to answer their question**
Y4	•Identify and describe the simple functions of the basic parts of the human digestive system •Describe the simple functions of the organs of the human digestive system •Identify the different types of human teeth and their simple functions	•Construct and interpret a variety of food chains, identifying producers, predators and prey. •Recognise that living things can be grouped in a variety of ways **Ask relevant questions and use different types of scientific enquiries to answer them**	•Identify how sounds are made, associating some of them with something vibrating •Recognise that vibrations from sounds travel through a medium to the ear	•Compare and group materials together, according to whether they are solids, liquids or gases •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 (°C)

	•Recognise that environments can change and this can sometimes pose dangers to living things **Ask relevant questions and use different types of scientific enquiries to answer them** **Decide which information needs to be collected and decide which is the best way for collecting it**	**Using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions**	•Find patterns between the pitch of a sound and features of the object that produced it •Find patterns between the volume of a sound and the strength of the vibrations that produced it •Recognise that sounds get fainter as the distance from the sound source increases. **Ask relevant questions and use different types of scientific enquiries to answer them** **Make predictions based on something they have found out** **Explain their findings in different ways, for example, display, presentation, writing** **Record and present what they have found using scientific language, drawings, labelled diagrams, keys, bar charts and tables**	•Identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature. **Ask relevant questions and use different types of scientific enquiries to answer them** **Take measurements using different equipment and units of measure and record what they have found in a range of ways** **Make accurate measurements using standard units** **Set up simple practical enquiries, comparative and fair tests**

4.8 Science Teaching Sequences by Class: Class 4

Class 4	Animals including humans	Living things and their habitats	Earth, Sun and Moon/Forces	Materials and their Properties	Electricity
Y4	•Identify and describe the simple functions of the basic parts of the human digestive system •Describe the simple functions of the organs of the human digestive system •Identify the different types of human teeth and their simple functions •Recognise that environments can change and this can sometimes pose dangers to living things **Ask relevant questions and use different types of scientific enquiries to answer them** **Decide which information needs to be collected and decide which is the best way for collecting it**	•Construct and interpret a variety of food chains, identifying producers, predators and prey. •Recognise that living things can be grouped in a variety of ways •Explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment **Ask relevant questions and use different types of scientific enquiries to answer them** **Using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions**	•Compare how things move on different surfaces •Notice that some forces need contact between two objects, but magnetic forces can act at a distance •Observe how magnets attract or repel each other and attract some materials and not others •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 •Describe magnets as having two poles Predict whether two magnets will attract or repel each other, depending on which poles are facing. **Ask relevant questions and use different types of scientific enquiries to answer them** **Make predictions based on something they have found out** **Explain their findings in different ways, for example, display, presentation, writing** **Record and present what they have found using scientific language, drawings, labelled diagrams, keys, bar charts and tables**	•Compare and group materials together, according to whether they are solids, liquids or gases •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 •Identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature. **Ask relevant questions and use different types of scientific enquiries to answer them** **Take measurements using different equipment and units of measure and record what they have found in a range of ways** **Make accurate measurements using standard units**	•Identify common appliances that run on electricity •Construct a simple series electrical circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers •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 •Recognise that a switch opens and closes a circuit and associate this with whether or not a lamp lights in a simple series circuit Recognise some common conductors and insulators, and associate metals with being good conductors. **Ask relevant questions and use different types of scientific enquiries to answer them** **Set up simple practical enquiries, comparative and fair tests**

Y5	•Describe the life process of reproduction in some plants and animals. Describe the changes as humans develop to old age. **Plan different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary**	•Describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird **Plan different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary** **Use test results to make predictions to set up further comparative and fair tests** **Report and present findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations**	•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. •Explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object •Identify the effects of air resistance, water resistance and friction, that act between moving surfaces Recognise that some mechanisms, including levers, pulleys and gears, allow a smaller force to have a greater effect. **Plan different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary** **Record data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs** **Identify scientific evidence that has been used to support or refute ideas or arguments.**	•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 •Know that some materials will dissolve in liquid to form a solution •Describe how to recover a substance from a solution •Use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating •Give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic •Demonstrate that dissolving, mixing and changes of state are reversible changes •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. **Plan different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary** **Take measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate**	•Associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit •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 •Use recognised symbols when representing a simple circuit in a diagram. **Plan different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary** **Use test results to make predictions to set up further comparative and fair tests** **Report and present findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations**

4.9 Science Teaching Sequences by Class: Class 5

Class 5	Animals including humans Revision of KS2 Biology	Evolution and inheritance	Properties and Changes of Material Revision of KS2 Materials and their properties 1 term	Earth, Sun and Moon and Light Revision of KS2 Physics 1 term
Y5	Describe the life process of reproduction in some plants and animals. •Describe the changes as humans develop to old age. **Plan different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary**	Describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird **Plan different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary** **Use test results to make predictions to set up further comparative and fair tests** **Report and present findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations**	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 •Know that some materials will dissolve in liquid to form a solution •Describe how to recover a substance from a solution •Use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating •Give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials •Demonstrate that dissolving, mixing and changes of state are reversible changes •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. **Use test results to make predictions to set up further comparative and fair tests** **Report and present findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations** **Plan different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary** **Take measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate**	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. •Explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object **Plan different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary** **Record data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs** **Identify scientific evidence that has been used to support or refute ideas or arguments.**

Y6	•Identify and name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood •Recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function •Describe the ways in which nutrients and water are transported within animals, including humans. •Recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago **Plan different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary**	•Recognise that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents •Identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution. **Plan different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary** **Identify scientific evidence that has been used to support or refute ideas or arguments** **Use test results to make predictions to set up further comparative and fair tests**	Revision of KS2 Materials and their properties **Plan different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary** **Take measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate** **Report and present findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations**	•Recognise that light appears to travel in straight lines •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 •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 •Use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them. **Plan different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary** **Record data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs**