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Science Curriculum

Document Control	
Title	Science Curriculum
Date	March 2025
Supersedes	June 2020
Amendments	September 2025
Review	March 2026

Intent

Aims

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 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

Scientific knowledge and conceptual understanding

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.

The nature, processes and methods of science

'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.

Spoken language

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.

EYFS

Beginning in Early Years, children use their senses to explore and investigate the world around them to develop their knowledge and skills, using cause and effect. The EYFS curriculum is designed to develop the characteristics of effective learning. Children and encouraged to create and think critically. They have and develop their own ideas and develop strategies for doing things. Children are encouraged to be active learners. They keep on trying if they encounter difficulties, and enjoy their achievements. Finally, children are encouraged to play and explore. They investigate and experience things, and 'have a go'.

Key stage 1

The principle 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

During years 1 and 2, pupils should be taught to use the following practical scientific methods, processes and skills through the teaching of the programme of study content:

- asking simple questions and recognising that they can be answered in different ways
- observing closely, using simple equipment
- performing simple tests
- identifying and classifying
- using their observations and ideas to suggest answers to questions
- gathering and recording data to help in answering questions

Lower key stage 2 – years 3 and 4

The principle 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

During years 3 and 4, pupils should be taught to use the following practical scientific methods, processes and skills through the teaching of the programme of study content:

- asking relevant questions and using different types of scientific enquiries to answer them
- setting up simple practical enquiries, comparative and fair tests
- making systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers
- gathering, recording, classifying and presenting data in a variety of ways to help in answering questions
- recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables
- reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions
- using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions
- identifying differences, similarities or changes related to simple scientific ideas and processes
- using straightforward scientific evidence to answer questions or to support their findings.

Upper key stage 2 – years 5 and 6

The principle 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 scientifically

During years 5 and 6, pupils should be taught to use the following practical scientific methods, processes and skills through the teaching of the programme of study content:

- planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary
- taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate
- recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs
- using test results to make predictions to set up further comparative and fair tests

- reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of and a degree of trust in results, in oral and written forms such as displays and other presentations
- identifying scientific evidence that has been used to support or refute ideas or arguments

Modifications

Life is the science lesson we all learn from and this involves exploring, talking about, testing and asking questions to develop ideas about scientific functions, relationships and interactions which cannot be undertaken in isolation. The curriculum that we teach has been planned to develop the five key skills for life of: Problem solving, Teamwork, Self-management (initiative, organisation, accountability) Self-belief (confidence, resilience, positive attitude) and Communication.

For these key skills to be developed, knowledge needs to be learnt and remembered and schemas need to be formed. We have developed the Science curriculum so that concepts build and children are able to construct schemas to be able to articulate processes. Using retention of knowledge skills regularly, helps to keep knowledge and vocabulary in the mind of the learner.

Implementation

We are committed to implementing our vision by providing exciting, hands on and practical experiences for all children in school. In turn, this will help promote independent learning curiosity and a love for enquiry and knowledge. Throughout the PlanBee scheme of work we follow, children will cover topics to develop a great understanding within Physics, Chemistry and Biology, building upon this as they progress throughout the school. All of this is underpinned through working scientifically and developing practical enquiry and investigation skills. This is implemented by weekly science lessons across the whole school, which are planned to be exciting, practical and engaging for all children. In every science lesson, children will build upon their existing scientific knowledge and skills, whilst creating links to the world around them. They are also challenged to question and explain their understanding to others using scientific vocabulary.

Once a year, the whole school works off timetable and participates in a 'science week'. This enables children to immerse themselves in science and its vocabulary for the week. They will learn about scientists, make real life links and work through the steps of scientific enquiry. Selected children are also exposed to A.I.M science day events to showcase and celebrate their passion for science.

Impact

It is the school's intent that the implementation of high-quality science teaching will have a positive impact on attainment levels, but also result in children who are curious about the world in which we live. Science is monitored and updated with resources to help reach the high levels (of) which we try to achieve. Through offering a practical, engaging and vocabulary rich curriculum, the impact will be in children who are confident, lifelong learners who continue to explore the world around them long after they leave Newall Green Primary School.

Health and safety

Throughout the science curriculum, there are specific lessons whereby risk management procedures are adhered to. This is to ensure that all children experience practical science in the safest possible manner and limit potential hazards occurring. This could include, but is not limited to, the use of liquids, sources of heat, handling of animals, the use of plants and micro-organisms, viewing of the sun and working with electricity. In these instances, teachers would create a risk assessment to identify potential hazards and act to either eliminate or control the risk. For example, frequent washing of hands, adult modelling the use of kettles, liaising with parents, teaching children safety guidelines and maintaining electrical appliances. These procedures are in place to enable children to explore and enjoy all the fun, practical aspects of the science curriculum, whilst managing the associated risks. An example risk assessment can be found in the subsequent appendices below.

Science Curriculum – EYFS, KS1 & KS2

	Autumn		Spring		Summer	
Nursery	All About Me	Celebrations	Traditional Tales	Insects & Minibeast	Under the Sea	Journeys/Moving On
Reception	Outside/Decay	Changes	Being Healthy	Seasons/Environments	Plants & Animals	Weather/Hot/Cold
Year 1	Everyday Materials	My Body	Identifying Animals	Seasonal Changes	Identifying Plants	
Year 2	Living in Habitats	Growth and Survival	Exploring Everyday Materials	Growing Plants		Super Scientists
Year 3	Rocks, Fossils and Soils	Forces and Magnets	Health and Movement	How Plants Grow	Light and Shadow	
Year 4	Eating and Digestion	Circuits and Conductors	States of Matter	Changing Sounds	Living in Environments	
Year 5	Life Cycles	Changes and Reproduction	Properties and Changes of Materials	Earth and Space	Forces in Action	
Year 6	Classifying Organisms	Seeing Light	Healthy Bodies	Evolution and Inheritance	Changing Circuits	

EYFS – Science Skills Progression

Organisation of Knowledge	Plants	Animals including Humans
Relevant ELG	**ELG: The Natural World** - Explore the natural world around them, making observations and drawing pictures of plants and animals. - Know some similarities and differences between the natural world around them and contrasting environments, drawing on their experiences and what has been read in class. **ELG: Speaking** Participate in small group, class and one-to-one discussions, offering their own ideas, using recently introduced vocabulary.	
KS1 readiness objectives	To know what a plant is To know what a flower is To know where you see plants To describe different plants and flowers	To know what an animal is To recognise and name a variety of different animals To know the names of different body parts of humans and animals they have experience of

Organisation of Knowledge	Everyday materials	Seasonal Change
Relevant ELG	**ELG: The Natural World** - Understand some important processes and changes in the natural world, including the seasons and changing states of matter. **ELG: Speaking** Participate in small group, class and one-to-one discussions, offering their own ideas, using recently introduced vocabulary.	
KS1 readiness objectives	To recognise that different everyday objects are made from different materials To describe how different objects, look and feel	To know about different types of weather To observe changes in trees and plants as the seasons progress

Organisation of Knowledge	Working Scientifically
Relevant ELG	**ELG: Listening, Attention and Understanding** - Make comments about what they have heard and ask questions to clarify their understanding. **ELG: Fine motor skills** - Use a range of small tools, including scissors, paint brushes and cutlery. **ELG: Building Relationships** Work and play cooperatively and take turns with others.
KS1 readiness objectives	To feel confident to answer simple questions about observable properties of objects and people, animals and plants around them To compare objects in their environment and talk about similarities and differences To ask questions about the world around them, and seek to find their own answers

KS1 & KS2 - Knowledge and Skills Progression

Science Curriculum

Year	Term	Scheme of work	Plants	Working Scientifically
1	Aut	Identifying Plants	• I know that a plant is a living thing that grows. • I know that plants need sunlight, air and water. • I know that plants have seeds that grow into new plants. • I can recognise where the seeds are in a variety of plants. • I can plant a seed and describe what I expect it to look like in a few weeks time. • I can identify and describe a variety of garden plants. • I can identify the difference between a flower and a tree. • I can identify a variety of wild plants. • I can identify and describe a variety of trees. • I know the difference between an evergreen and a deciduous tree. • I can identify the roots, stem, leaves, flower and petals of a flower. • I know what roots are and why they are important. • I can describe the changes a seed goes through as it becomes a plant.	• I can observe plants closely and draw my findings. • I can use a simple classification key to identify wild flowers. • I can use close observation to explain how a seed changes to a plant.
2	Aut	Growing Plants	• I know that different seeds grow into different plants. • I can use information on a seed packet to tell me when a seed should be planted, how to plant it and how to care for the seed as it grows into a plant. • I can follow the instructions on a seed packet to plant a seed. • I know that seeds can be eaten by humans and animals. • I know that some plants grow from bulbs. • I can explain the life cycle of a plant grown from a bulb, such as a tulip. • I know that the bulb provides a store of food for the plant while it is in the ground during the winter months. • I know that the fruit of the plant is the part that carries the seeds. • I can explain why most plants grow lots of seeds instead of just one. • I can explain some of the ways in which seeds are dispersed. • I know that not all seeds will grow into a new plant and can explain reasons for this. • I know that the term 'germination' refers to the process when a seed starts to grow and produce shoots.	• I can carry out an experiment to observe how the roots of a bulb grow. • I can use close observation to examine different fruits to see how many seeds they have, making predictions beforehand. • I can plan and set up an experiment to find out which conditions are best for seed germination. • I can suggest how to make an experiment a fair test. • I can use the results of my experiment to draw a diagram explaining the best conditions for seed germination. • I can use observation to explain how a seed changes over time.
3	Aut	How Plants Grow	• I can identify and describe the functions of the roots, stem, leaf and flower of flowering plants. • I know that the root is the first part of the plant to grow from the seed and that the young root absorbs water and minerals from the soil to help the seed sprout. • I can describe each step in the growth of roots. • I can describe the process of water transportation in plants. • I can explain what the process of photosynthesis is. • I know that the plant uses minerals from the soil to make chlorophyll in its leaves. • I can explain what the process of pollination is. • I can explain some of the ways pollen grains get from the male stamen to the female part of the plant. • I can order the stages in the life cycle of flowering plants. • I can identify the ways in which a variety of different plants disperse their seeds. • I know that seeds have an outer coat to protect them that starts to absorb water and soften when it lands in soil. • I know that seeds can have one, two or three seed leaves that store food. • I know that seeds are an important source of food for animals.	• I can observe root growth over a period of time and record my observations in a table. • I can generate ideas for an experiment to test water transportation in plants. • I can plan, set up and carry out an experiment to show how water is transported in plants, making a prediction and recording my observations. • I can make a comic strip to explain the process of pollination, using vocabulary such as stamen, stigma, ovary, nectar and petals. • I can classify plants according to their seed dispersal method. • I can taste test a variety of different seeds. • I can gather data about our class's favourite seeds in a chart. • I can ask and answer questions about the seed data I have gathered.

Year	Term	Scheme of work	Animals, including Humans	Working Scientifically
1	Aut	Identifying Animals	• I can identify and name a variety of common UK pets. • I can identify a variety of UK mammals, birds, reptiles, fish and amphibians. • I know that mammals have backbones, feed their young with milk and have fur. • I can find a similarity or difference between pairs of mammals. • I know that birds have feathers, wings and a beak. • I know that lizards are cold-blooded vertebrates that lay eggs. • I can identify differences in the features of birds and lizards. • I know that fish and amphibians lay eggs. • I know the steps in the life cycles of amphibians and fish, and spot similarities and differences. • I know what a herbivore, carnivore and omnivore are. • I can identify common animals that are herbivores, carnivores and omnivores. • I can explain some of the ways in which people need to look after pets.	• I can use a Venn diagram to sort animals to show which are herbivores, carnivores and omnivores. • I can use a tally chart to gather data about our class's favourite pet. • I can use a tally chart to gather information about minibeasts I spot. • I can use information I have gathered in tally charts to answer simple questions.
1	Spr	My Body	• I can name the different parts of my body, such as arms, legs, head, wrist, fingernails, etc. • I can describe which parts of my body I use for different activities. • I can name the five senses. • I can describe why each of the five senses is important, and how we use each one. • I know that the senses of smell and taste are very closely linked.	• I can carry out a blind test to identify familiar smells. • I can gather facts about the sense of smell to answer questions. • I can taste different fruits and use appropriate vocabulary to describe them.

2	Spr	Growth and Survival	• I know that all species of animals have babies, including humans, and that if they didn't the species would become extinct. • I can match a variety of baby animals to their parents. • I know that some baby animals look very similar to their parents and some look very different. • I know that mammals give birth to live young and birds, reptiles and fish lay eggs. • I know that different animals are pregnant for different lengths of time, and that this is often dependent on the size of the animal. • I know that the eggs animals lay are vulnerable to predators and other dangers, which is why the parent animal often builds a nest to keep them safe and lays several eggs at once. • I know that some eggs have hard shells and some eggs have soft shells. • I can identify a variety of animals that give birth to live young and those that lay eggs. • I can explain the stages a human goes through to grow from a baby to an adult. • I know that all animals need food, water and air to stay alive, and that some animals breathe oxygen with their lungs while fish that live under water take in oxygen through their gills. • I know that animals need to live in different environments to get the food, water and oxygen they need. • I know that it is important to eat a healthy balance of foods because different foods are useful to our bodies for different things. • I can use the food pyramid and balanced plate model to find out how much carbohydrate, fruits and vegetables, protein, dairy, fats and sugars I should eat. • I can plan a healthy, balanced meal. • I know that exercise is important to keep our heart and lungs healthy, and that it keeps our muscles strong and flexible. • I know that exercise is important to keep us from getting overweight. • I can design an exercise to work my whole body using different apparatus.	• I can carry out my own research using simple sources to find out what a particular animal needs in order to survive.
2	Sum	Super Scientists	• I can explain the contributions Florence Nightingale, Joseph Lister and Alexander Fleming made to knowing what makes us ill and how to stop the prevention of germs and diseases.	• I know that scientists discover new things and make advances because they ask questions and work out how to find the answers. • I can carry out simple tests to test my reflexes, recording the results systematically in a table. • I can carry out an experiment to see how many germs are on our hands before and after we wash them. • I can make predictions about what will happen in an experiment.
3	Aut	Health and Movement	• I know that animals, including humans, get the nutrition they need from what they eat. • I know that the two main reasons humans need food is for growth and energy. • I know that we need proteins for growth and to help repair our bodies when we are ill or injured. • I know that starches, fats and sugars are good foods for energy. • I can explain how to eat a healthy, balanced diet. • I can design healthy, balanced meals for people who have dietary restrictions, e.g. vegetarians or people with wheat/dairy allergies. • I know that we have skeletons to support our bodies, protect our internal organs and to help us move. • I can name and locate some of the major bones in the human body. • I can describe similarities and differences between human and animal skeletons. • I know that all vertebrates have a backbone. • I can explain how invertebrates without an internal skeleton protect themselves. • I know that we need muscles to help us move. • I can explain the difference between smooth muscles, cardiac muscles and skeletal muscles. • I can explain the role of flexors and extensors in making our bones move.	• I can classify a variety of foods into different food groups. • I can carry out my own research to find out what foods different animals eat, and record my findings. • I can generate questions to investigate to find out what pets eat. • I can gather data in a tally chart and convert the results into a pictogram. • I can use data to draw conclusions and find the answer to my question. • I can label a diagram of the human skeleton. • I can use a variety of sources of information to find out how invertebrates protect themselves and report my findings. • I can ask and answer questions about muscles. • I can make different movements with my body and explain which muscles I am using.
4	Aut	Eating and Digestion	• I can suggest similarities and differences in the diets of a variety of different animals. • I can identify herbivores, carnivores and omnivores in a variety of different habitats. • I can interpret and construct a variety of food chains with both producers and consumers. • I can suggest what might happen if one or more organisms was taken out of a food chain. • I can identify where canines, incisors and molars are in the human mouth. • I can explain the function of canines, incisors and molars. • I know that teeth have roots that hold the teeth in place in the gums. • I can suggest why different animals have different types of teeth. • I know that young children have 20 milk teeth that start growing through when they are around six months old. • I know that milk teeth fall out and are replaced by 32 adult teeth, which are permanent. • I know that tooth decay can cause teeth to rot and fall out. • I can suggest some ways of making sure my teeth stay healthy. • I can name the organs associated with the digestive system. • I can describe the functions of the basic parts of the digestive system.	• I can classify a wide variety of animals to show whether they are herbivores, carnivores or omnivores. • I can present information about how to keep teeth healthy. • I can draw a diagram to show what I think the digestive system looks like and how it works. • I can ask a variety of questions about the digestive system and use different sources to find out the answers. • I can label a diagram of the digestive system and describe how it works. • I can plan and carry out an experiment (making sure it is a fair test) to explore how acid affects the food in our stomachs.

5	Aut	Changes and Reproduction	• I can describe some of the ways our bodies change as we grow. • I know that our rate of growth is dependent on many different factors. • I can name the different stages in the human life cycle and put them in order. • I can describe the stages in the gestation period of humans and compare this to other animals. • I can describe the growth and development of children from age 0 to 11. • I understand the role of hormones in puberty. • I can describe the changes that occur to both boys and girls during puberty. • I can describe some of the ways teenagers can keep fit and healthy during all the changes that take place during puberty. • I know that a human is fully grown by the time they reach the age of around 20. • I know that the human body starts to deteriorate as it enters old age. • I can describe some of the ways in which humans can make sure they stay fit and healthy as they get older.	• I can create a bar chart to show the gestation period of a range of animals, and use this to answer questions. • I can compare gestation periods in animals with the female animal's weight, and use this to draw conclusions. • I can write a report about the development of children from age 0 to 11. • I can label diagrams of boys and girls to show the changes that take place during puberty.
6	Aut	Healthy Bodies	• I know that people have not always known that disease and illnesses were often related to diet, such as scurvy. • I know that James Lind is credited as being the scientist who conducted the world's first clinical trial to explore the effects of diet on scurvy. • I know that there are two groups of carbohydrates: sugars and starches. • I can describe the importance of the different food groups and why each one is important for keeping our bodies healthy. • I can name some different minerals and why they are important for our bodies. • I can use food labels to match foods to their nutritional values. • I can use food labels to assess how healthy a food is, explaining reasons for my choices. • I know that it is our circulatory system that transports nutrients around our bodies, and that the two organs associated with the circulatory system are the heart and lungs. • I can describe the functions of the heart and lungs. • I can describe how the circulatory system works. • I know that it is important to keep our hearts healthy and that exercise is a crucial part of this. • I know that it is the muscles in our bodies that allow us to move. • I can explain the difference between smooth muscles, cardiac muscles and skeletal muscles. • I can name some of the different muscle groups in the human body. • I can explain which muscles we use for a variety of different physical activities. • I can explain what happens to our muscles and the rest of our body when we exercise. • I can define what a drug is. • I know that some drugs are very beneficial and others are very harmful, and that some drugs are legal and some are illegal. • I can describe the short-term and long-term effects of drugs such as tobacco and alcohol. • I can make suggestions about the ways in which given characters can change their lifestyles to make them healthier.	• I can plan an experiment, as James Lind, to see whether eating different foods can cure scurvy. • I can suggest ways in which James Lind could have expanded his clinical trial. • I can plan a clinical trial to explore the effects of different foods on our bodies, explaining how I will make it a fair test and what I expect the results to show. • I can allocate a variety of foods to their correct food group. • I can assess a variety of food labels to assess which of a group of foods has e.g. the most and least fat, or the most and least carbohydrate. • I can use a diagram of the human heart to suggest how it works. • I can write a detailed report about how the circulatory system works. • I can dissect a heart to explore the heart's chambers, veins and arteries, writing a recount of my findings. • I can take my own pulse before and after exercise, recording the differences. • I can design an investigation to explore how exercise affects our heart rate and draw conclusions from my results. • I can label muscle groups on a diagram of the human body. • I can suggest some exercise that would train different muscle groups. • I can create a presentation to answer a particular question about drugs, using my own research to find answers.

Year	Term	Scheme of work	Materials and States of Matter	Working Scientifically
1	Spr	Everyday Materials	• I know what a material is. • I know the difference between a material and an object. • I can name a variety of materials. • I can describe a material's properties using adjectives. • I can explain why some materials are better suited for different purposes than others.	• I can follow instructions to perform a simple test to see whether a material is waterproof or not. • I can use my observations to suggest which materials would be best for an umbrella.
2	Spr	Exploring Everyday Materials	• I can use a range of appropriate vocabulary to describe the properties of different materials. • I know the difference between a natural and a man-made material. • I know that the same product, e.g. a table, can be made from a variety of different materials, and can suggest suitable materials for each object. • I can explain how glass, pottery and paper are made. • I know that some materials can change shape permanently, some can change shape and go back to their original shape, and some can't change shape. • I can name a variety of materials that can change shape, can change shape temporarily and cannot change shape. • I know that there are lots of different types of plastic that can be used for different purposes. • I can explore the suitability of plastic and metal for different purposes, and explain why each material has been chosen for each different purpose. • I know that paper and cardboard are made from wood and can describe the benefits of using paper and cardboard over wood for different purposes. • I can name some objects that can all be made from wood, plastic and metal, e.g. chairs. • I can suggest appropriate materials for an object to be made from, based on what the object will be used for and who will use it.	• I can suggest different ways of sorting materials based on their properties and characteristics. • I can sort materials into those that are natural and those that are man-made. • I can experiment with what happens to different materials when you bend, twist, stretch and squash them, recording my observations. • I can make predictions about how materials will behave. • I can experiment with ways of making a paper bridge that is strong enough to hold a toy car.

3	Spr	Rocks, Fossils and Soils	• I know that most of our planet is made up of rock and that rocks are made up of a mixture of minerals that are pressed tightly together. • I can distinguish between rocks that are naturally occurring and those that are not. • I know that erosion is the process when something is worn away by water, wind or other natural materials over time. • I know that a pedologist is a scientist that studies soil. • I can explain why soil is so important to our planet. • I know that there are different layers of soil and that each layer is known as a horizon. • I can describe the features of each different soil horizon. • I know that the three main types of soil are clay, sand and silt. • I know that scientists split rocks into three main groups: igneous rock, sedimentary rock and metamorphic rock. • I know that igneous, sedimentary and metamorphic rock can change over millions of years in a process known as the rock cycle. • I know that a fossil is the petrified remains of plants and animals from more than 10,000 years ago. • I can explain how fossils are formed. • I know that a palaeontologist is a scientist who studies fossils. • I know that some fossils are common and some fossils are very rare. • I can identify some organisms from their fossils.	• I can classify rocks that are natural and those that are man-made. • I can identify a variety of natural and manmade rocks in my local environment. • I can suggest which criterion has been used to sort rocks into two groups. • I can sort rocks into Venn diagrams and Carroll diagrams based on specific criteria. • I can use my own criteria for sorting rocks into a Carroll diagram. • I can generate ideas for an experiment to test different rocks to see how much they erode. • I can carry out an experiment to test the erosion rate of different rocks, making predictions and recording my findings appropriately. • I can use a variety of sources of information to help me find out about specific rocks and their uses. • I can use observation to explore different soil samples and rank them according to different criteria. • I can classify fossil samples according to various criteria.
4	Spr	States of Matter	• I know the difference between a liquid and a solid. • I know how to tell if a material is a liquid or a solid. • I know that gases have mass. • I can describe the properties of a solid, liquid and gas. • I can explain what would happen if a solid, liquid and gas were poured into a container. • I know that solids, liquids and gases behave differently because the particles of each behave differently. • I know that water turns from a liquid to a solid at 0°C and from a liquid to a gas at 100°C. • I know that metals all have different melting points and that these are usually very high temperatures. • I know that the process of a liquid turning into a gas is called evaporation. • I know that the process of a gas cooling and turning into a liquid is called condensation. • I can explain how evaporation and condensation are part of the water cycle.	• I can compare and classify materials according to whether they are solids or liquids. • I can carry out an investigation to see if air weighs anything and report on my findings. • I can draw diagrams to show how the particles in solids, liquids and gases behave differently. • I can experiment with pneumatics and make observations about what I'm doing. • I can research the melting points of a variety of materials. • I can plan and carry out an experiment to see the different melting points of chocolate and evaluate the fairness of my experiment. • I can give different everyday processes which involve melting and freezing. • I can draw diagrams and use written examples to show the processes of evaporation and condensation. • I can label a diagram of the water cycle to show what is happening.

5	Spr	Properties and Changes of Materials	• I know that some materials will dissolve in water to form a solution. • I know that not all materials react the same way when mixed with water; some will float, sink, dissolve or react. • I know that dissolving is a reversible change. • I know that soluble materials, such as sugar, are able to be separated from water through evaporation. • I know that filtering is a good way to separate water from insoluble materials, such as sand. • I can identify a range of mixing processes, dissolving processes or changes of state that are reversible. • I know that an irreversible change occurs when two materials react with each other to form a new substance. • I can explain what would happen to a variety of materials when they were heated and cooled, and explain whether these are reversible or irreversible changes. • I know that some materials change state when they are heated or cooled. • I know that when a material is burned, it produces a new product (e.g. gas or ash), which makes burning an irreversible change. • I can identify the properties of a variety of everyday materials, such as whether it is magnetic, conductive, soluble, flexible, etc.	• I can mix a variety of materials with water to see whether they will dissolve, float, sink or react, recording the results in a table. • I can classify materials depending on whether they dissolve, float, sink or react when mixed with water. • I can investigate different irreversible changes by mixing different materials together, observing the results and explaining what has happened. • I can compare and classify a variety of everyday materials based on their properties. • I can carry out a variety of investigations to explore the properties of materials to see if they e.g. conduct electricity, are magnetic, are soluble, etc. • I can give reasons, based on evidence from comparative and fair tests, for uses of everyday materials. • I can plan, set up and carry out a fair test, drawing conclusions and presenting the results.
Year	**Term**	**Scheme of work**	**Living Things and their Habitats**	**Working Scientifically**

2	Aut	Living in Habitats	• I know the difference between things that are living, things that are dead and things that have never been alive. • I can name the seven life processes that all living things need to be able to do to stay alive. • I know that all living things will eventually die. • I know what a habitat is. • I know that all living things need to live in a habitat that can provide them with the things they need to stay alive. • I can suggest what type of animals might live in a variety of different habitats. • I can match animals to their correct habitat. • I can identify and name some of the plants and animals that live in a seaside habitat. • I know that the plants and animals in a habitat are all dependent on each other for survival. • I can describe some habitats and their features in other parts of the world, such as rainforest, desert and Arctic habitats. • I can describe why some animals are well suited to their rainforest, desert or Arctic habitats. • I can describe what a microhabitat is. • I can identify some of the minibeasts that live in microhabitats. • I know that plants and animals in a habitat are linked to each other through food chains. • I know that plants get their energy from the sun. • I can construct some simple food chains for a variety of habitats.	• I can classify things that are living, things that are dead and things that have never been alive. • I can explore and observe microhabitats in the local environment. • I can experiment with ways of separating a variety of materials from water, choosing suitable equipment for the task.
4	Aut	Living in Environments	• I can give a definition for the term 'habitat'. • I can suggest in which habitat you would find a variety of animals. • I can explain why it is important to be able to classify organisms. • I can identify animals that are vertebrates, invertebrates, mammals, birds, insects, fish, reptiles, amphibians, insects, annelids, crustaceans, arachnids, echinoderms and molluscs. • I can identify and classify a variety of British plants. • I know that changing just one thing in a habitat can have a big impact on all the organisms living there. • I can describe what deforestation is and why it is causing a big problem around the world. • I can describe some of the ways in which humans can both help sustain environments and ways in which they harm environments. • I can explain the negative impact draining a pond would have on the local environment, stating my case through a letter.	• I can explore my local area to see how many different habitats there are. • I can use a variety of clues in riddles to help me identify different animals. • I can classify a variety of organisms using my own and given criteria, sorting the results into tables and Carroll diagrams. • I can use a classification key to identify which group an animal belongs to. • I can use a classification key to identify unfamiliar organisms.

5	Aut	Life Cycles	• I can describe the process of sexual reproduction in flowering plants, using each of these terms: petal, anther, carpel, filament, ovary, stamen, stigma, sepal and style. • I can describe the process of asexual reproduction in plants, giving some examples of plants that reproduce asexually. • I can describe how and why humans clone plants. • I can describe the process of sexual reproduction in animals. • I know that some animals reproduce externally and others reproduce internally, giving examples for each. • I can describe how the environment in which an animal lives affects the way it reproduces. • I know that hermaphrodites are animals that have both male and female reproductive organs, such as snails. • I can identify animals that live in a British woodland environment. • I can compare different habitats around the world with a British woodland environment and suggest ways in which the living conditions may be more or less challenging for the organisms living there. • I can suggest ways in which the life cycles of different animals might vary in different environments around the world. • I can describe and compare the life cycles of a variety of mammals, reptiles, fish and other animals. • I can describe what a naturalist does. • I can explain the contribution of some famous naturalists to our understanding of nature and the importance of humans looking after the environment.	• I can label the parts of a flowering plant correctly using their scientific names. • I can dissect a flower to explore the male and female parts of the plant. • I can write scientifically accurate descriptions of asexual reproductions in plants using 100 words or less. • I can follow instructions to grow a new plant from cuttings. • I can classify a variety of animals according to how they reproduce. • I can create a scatter graph to show animal gestation and incubation periods, using the information to generate statements and answer questions. • I can research and present data and information about the organisms living in a variety of environments around the world. • I can compare the life cycles of a variety of animals. • I can carry out independent research to find out about the life and achievements of a famous naturalist.

6	Aut	Classifying Organisms	• I can match organisms to their correct group (plant, mammal, amphibian, reptile, bird, fish, insect, crustacean, arachnid or mollusc, as well as echinoderm, myriapod and annelid) using what I know about the features of each group. • I can explain why it is important to be able to classify organisms. • I know the difference between vascular and non-vascular plants. • I can describe the difference between flowering and non-flowering plants. • I know that Carl Linnaeus is known as the Father of Taxonomy because of the system he developed to help classify organisms. • I know that the Linnaeus system uses Latin names for organisms so that there was a globally recognised naming system. • I can describe what each of the seven levels on the classification system are: kingdom, phylum, class, order, family, genus and species. • I can describe what a micro-organism is. • I know that micro-organisms can be classified into the kingdoms of protists, bacteria and fungi. • I can describe some examples of micro-organisms, such as in food production and illnesses.	• I can classify a variety of organisms into groups according to their features. • I can use a classification key to help me identify which group unfamiliar animals belong to. • I can create a presentation with labelled diagrams to show the features of each group of animal. • I can use a variety of criteria to classify animals that belong to the same group, e.g. mammals. • I can create a classification key to help identify a variety of flowering and nonflowering plants. • I can gather plant samples (or photographs of plants) from the local area, then create a classification key to identify them. • I can find a variety of different ways to classify different plants. • I can use the Linnaeus classification system to identify the kingdom, phylum, class, order, family, genus and species of a variety of organisms. • I can use the Linnaeus classification system to answer questions about different organisms. • I can carry out my own research to create a report about a particular family of animals, including pictures, diagrams and information. • I can ask questions about micro-organisms and use my own research to answer them. • I can carry out a fair test to explore which foods yeast most likes to eat, recording the results and drawing conclusions. • I can gather samples of organisms in the local area (or take photos) to identify and classify organisms found in the local area. • I can carry out my own research to find out about different groups of organisms in a different part of the world, presenting my findings appropriately.
6	Spr	Evolution and Inheritance	• I know that living things produce offspring of the same kind, but that normally offspring vary and are not identical to their parents. • I can suggest some common inherited characteristics, e.g. hair colour, eye colour, height, etc. • I know that 'variation' occurs from generation to generation in a species. • I can identify examples of variation in animals that are cross-bred. • I can identify the features of the environment an animal lives in and can explain some of the ways in which the animal has adapted to suit its environment. • I know that some inherited features are advantageous and some are not. • I know that, over many generations, advantageous features may be spread across a whole species, making them better adapted to their environment. • I understand how the adaptation of plants and animals to suit their environment may lead to evolution. • I can explain Darwin's theory of evolution and the process of natural selection. • I know that Darwin explained each step in the Linnaeus classification system to show where part of a population developed a new variation and eventually formed a new species. • I know that some variations are caused by mutations, and that some of these are harmless, some are advantageous and some are disadvantageous. • I know that changes to an environment can affect the evolutionary process. • I know that palaeontologists study fossils to explore how species have evolved over time. • I understand how humans have evolved over time, and how human behaviour can affect changes in other species over time.	• I can identify features I have inherited from my parents and note variations. • As a class, we can arrange ourselves in different ways according to our inherited characteristics. • I can carry out my own research to find animals that live ir a particular environment around the world, recording the features that make it advantageous for its habitat. • I can compare and contrast the features of two animals living in the same environment, explaining why each of their features are advantageous for that particular species. • I understand that scientists are always refining, changing and developing the ideas of other scientists, and that ideas can be refuted when further evidence is uncovered. • I can ask questions about evolution and use my own research to find the answers, presenting my findings. • I can create a fact file about Charles Darwin, using known facts and my own research. • I can read statements and write persuasive arguments to show whether I agree or disagree, drawing on my knowledge of evolution and inheritance.
Year	**Term**	**Scheme of work**	**Forces**	**Working Scientifically**
2	Sum	Super Scientists	• I know that Isaac Newton was the first person to identify gravity as a force. • I know that gravity is a force that makes things fall to the ground and stops things from floating around in the air.	• I can carry out an investigation to explore the effect adding paper clips to a spinner has on the length of time it takes the spinner to reach the ground. • I can design a marble run with the intention of it taking the longest possible time for the marble to reach the ground.

3	Sum	Forces and Magnets	• I know that a force is a push or a pull on an object, and that a force needs two objects where one pushes or pulls the other to make it move. • I can describe whether a push or a pull is being used to move an object, and describe which direction the forces are acting in. • I know what a forcemeter is and can use one to measure forces in newtons. • I know that some forces, like gravity and magnetism, do not need contact between two objects to make things move. • I know that magnets have a north pole and a south pole. • I can describe lots of different uses for magnets.	• I can carry out a fair test to explore whether objects need the same force to move them across different surfaces. • I can make predictions about the results of my investigation. • I can use my results to draw conclusions. • I can explore whether magnets attract or repel when north poles and south poles are put together. • I can draw diagrams to show the results of my findings. • I can predict which materials will be magnetic and which will not, then test my hypothesis. • I can carry out my own research to find out about uses for magnets and report my findings.
5	Sum	Forces in Action	• I know that the Earth's gravitational force causes objects to have weight, and that gravity pulls objects towards the centre of the Earth. • I know that friction is the force that acts as resistance between two objects when moving over one another. • I can explain examples of friction using photographs. • I know that air resistance is the force that occurs when air pushes against a moving object, making it slow down. • I can explain examples of how air resistance is used. • I know that water resistance is the force that pushes against objects as they pass through the water. • I know that the shape of an object dictates how much water resistance it will meet as it moves through the water. • I know that pulleys and levers make heavy objects easier to lift and can explain why. • I know that gears allow a smaller force to have a greater effect. • I know that two or more gears working together are called a transmission. • I can explain which direction a follower gear will turn based on the movement of the driver gear when two or more gears are used in a transmission. • I know that the force transmitted by gears in a transmission is called torque. • I can give some examples of how gears and transmissions are used in everyday life. • I can recognise some different types of gears, such as worm gears, rack gears and bevel gears.	• I can carry out an investigation to explore the effect of gravity on falling objects, taking careful measurements and observations to draw conclusions. • I can carry out independent research to find out about the roles Newton and Galileo played in helping our understanding of gravity, presenting my findings appropriately. • I can suggest ways to plan an experiment to find out which surface has the most friction when an object is moved across it. • I can carry out a fair test to explore the friction of different surfaces, recording my results accurately and using them to draw conclusions. • I can analyse a variety of statements, explaining which I agree with and why. • I can plan, set up and carry out an investigation to explore how the size of a parachute affects the speed at which it falls to the ground, recording my results appropriately and using them to draw conclusions. • I can make predictions about which shape of plasticine would fall quickest in a pot of water, giving scientific explanations for my choices. • I can carry out an experiment to test my predictions, recording my results using a stopwatch and using evidence to draw conclusions. • I can create some simple pulleys, exploring the different forces needed to pull the same object and drawing conclusions from my findings. • I can use card or construction toys to create different transmissions, exploring the movement and torque of the driver and follower gears.

Year	Term	Scheme of work	Light and Sound	Working Scientifically
2	Sum	Super Scientists	• I know that Isaac Newton worked out that the light from the sun is made up of lots of different colours mixed together, and that we see this as white light. • I know that you can reverse the process of splitting light with a prism by passing the light through a lens to turn it back into white light. • I can use what I know about light to explain why we have rainbows.	• I can observe what happens when light passes through a prism and record my findings. • I can generate questions to help find out about Alexander Graham Bell and his invention of the telephone. • I can carry out investigations to explore how sound travels using a string telephone.
3	Spr	Light and Shadow	• I know that we need light in order to see. • I can name a variety of natural and man-made light sources. • I know that the Sun is the most powerful light source. • I know that we have night and day because the Earth rotates on its axis once every 24 hours. • I can describe the difference between dawn and dusk. • I know that shadows are formed when light is blocked by an object. • I know that we have more shadows on a sunny day than on a cloudy day and can explain why. • I know the difference between transparent, translucent and opaque objects. • I know that opaque objects will cast a shadow, translucent objects will cast a faint shadow, and transparent objects will not cast a shadow. • I know that we can see objects because light is reflected from their surfaces; light travels in a straight line from the source to the objects, then bounces off the object to our eyes. • I know that some objects reflect more light than others. • I know that when a surface is very smooth, like a mirror, it reflects a lot of light which is why we can see a reflection.	• I can identify a variety of light sources around my school. • I can predict which light sources would be strongest, comparing my predictions with a partner and discussing any differences. • I can explain in my own words why we have night and day, using appropriate vocabulary. • I can test whether an object is transparent, translucent or opaque by testing what kind of shadow it casts. • I can explain which shadow diagram is correct, using what I know about how shadows are formed. • I can investigate how shadows behave, finding ways to make shadows move and make them longer and shorter. • I can record results from my shadow experiments using diagrams. • I can predict what I think will happen to a shadow throughout the day. • I can carry out an experiment to find out what happens to shadows throughout the day, recording my results in a table. • I can draw conclusions from my shadow investigation to say what I have found out. • I can experiment with using mirrors to see around corners.

4	Spr	Changing Sound	• I know that sound travels through the air in waves and that sound waves are caused by vibrations in the air. • I know that sound waves pass through some materials more easily than others. • I know that sometimes sound needs to be muffled for safety or convenience. • I can name a variety of musical instruments, describe what they sound like and explain how the sound is made. • I know what the terms 'pitch' and 'volume' mean. • I can identify when the pitch and volume of a sound changes, and explain what has happened. • I can explain how the length, thickness and tightness of a string affects its pitch. • I can explain how the length of the air column in wind instruments changes the pitch.	• I can investigate a range of objects that show visible vibrations to help me understand how sound waves work. • I can predict how well sound will travel through a variety of different materials. • I can plan, set up and carry out an experiment to answer the question, 'Do sound waves travel through all materials equally?' • I can generate questions to investigate what happens to a sound as you get further away from it. • I can plan, set up and carry out an experiment to see which materials are best for soundproofing. • I can draw conclusions from my investigations to answer a question. • I can make predictions about the pitch and volume an instrument will produce, using my knowledge of how sound works. • I can draw a diagram to show how and why the pitch changes on a glockenspiel. • I can investigate a variety of stringed instruments to explore how the pitch changes according to the length, thickness and tightness of the string, and record my findings. • I can predict which bottle would produce the highest pitch when different amounts of water are inside, then test my prediction and record my results.
6	Spr	Seeing Light	• I can name the different parts of the eye and describe their function. • I know that light can only travel in a straight line. • I can explain how mirrors can be used to reflect light. • I can explain how objects such as periscopes and rear-view mirrors work and why they are useful. • I know that the angle the light lands on the mirror will affect which angle the light changes direction to, and I know that this is called the angle of reflection. • I know that some surfaces reflect more light than others. • I can explain the difference between a shadow and a reflection. • I can explain how a mirror could make a shadow and a reflection at the same time.	• I can draw on my previous knowledge of light and shadow to answer a variety of questions. • I can use careful observation to identify the pupil, cornea, iris and sclera of the human eye. • I can use arrows to draw the direction light travels. • I can label a cross-section diagram of the human eye, explaining the function of each part. • I can present information about how the eye works in a variety of different ways. • I can use what I know about the angle of reflection to draw the angle light will reflect off a mirror. • I can use what I know about the angle of reflection to shine a light beam to a goal using mirrors. • I can make predictions about which surfaces will reflect a lot of light and which won't. • I can investigate a variety of surfaces to see which reflect a lot of light and which don't, noting similarities and differences between the two groups. • I can suggest a variety of investigations to explore how shadows behave. • I can carry out an investigation to explore what happens to the size and shape of a shadow when an object is moved further away from a light source, recording my results in graphs and tables.

Year	Term	Scheme of work	Electricity	Working Scientifically
2	Sum	Super Scientists	• I know that Edison invented the first light bulb that could last for more than 12 hours. • I know that a circuit needs a bulb, battery and wire to work. • I know that a circuit needs to be complete for it to work. • I know the symbols for wire, bulb and battery. • I can create a simple working circuit.	• I can answer questions I have generated and suggest how to find answers to questions that I haven't answered yet.
4	Sum	Circuits and Conductors	• I know that atoms generate electricity when they are rubbed together. • I can explain the difference between static electricity and current electricity. • I know that current electricity needs a complete circuit in order to work properly. • I can use diagrams to explain which circuits will and won't work. • I can explain the difference between mains and batterypowered electricity. • I can describe some of the ways in which people can stay safe when using mains electricity. • I can distinguish between objects that use mains electricity and those that use battery-powered electricity. • I can write a definition for the words 'conductor' and 'insulator'. • I can explain why some appliances are made with conductors on the inside and insulators on the outside. • I can explain how switches work to complete a circuit.	• I can test different materials using a simple circuit to see whether they are conductors or insulators. • I can use what I found out about conductors and insulators to draw conclusions. • I can classify objects into those that are conductors and those that are insulators. • I can draw diagrams to show appliances that have conductors on the inside and insulators on the outside. • I can experiment with a variety of objects and materials in a simple circuit to create a working switch. • I can incorporate a buzzer into a circuit that makes a sound when the switch is on. • I can plan, set up and carry out an investigation to find out how you can change the brightness of a bulb, making sure it is a fair test.

6	Sum	Changing Circuits	• I can define each of these terms: circuit, current, conductor, insulator, volt, component, battery, motor. • I know the difference between a series circuit and a parallel circuit. • I know that if there are too many volts running through a circuit, it will blow the component. • I can recognise and use conventional symbols used in circuit diagrams.	• I can work independently to create a series and a parallel circuit. • I can create series and parallel circuits to match a circuit diagram. • I can use what I know about voltage to predict the brightness of a bulb or bulbs in a variety of different circuits. • I can experiment with the best way to make the bulb in a circuit as bright as possible, recording my results on a scale. • I can draw a circuit diagram that includes conventional circuit symbols. • I can create series and parallel circuits to match a circuit diagram that uses conventional circuit symbols. • I can plan, set up and carry out a fair test to see how changing the wire in a circuit affects the brightness of a bulb. • I can use the results of my experiment to answer questions. • I can ask questions about circuits I would like to find the answer to, and decide how to find the answers. • I can design and create a circuit for a particular purpose.

Year	Term	Scheme of work	Earth and Space	Working Scientifically
1	Sum	Seasonal Changes	• I know that the weather is always changing and that we have many different types of weather. • I know that there are four seasons in the UK. • I can name the months each season occurs in. • I can identify the main features of each of the different seasons. • I can describe different clothing that is appropriate to wear during each season. • I can identify differences between each of the four seasons. • I can describe how animals are affected by each of the four seasons, and how their behaviour changes during each one. • I can describe some of the ways humans adapt to the different seasons, e.g. by what we wear, eat and do. • I know that some foods are seasonal. • I know that the number of hours of daylight changes throughout each of the four seasons. • I know that there are more hours of sunlight during the summer than during the winter.	• I can transfer data from a tally chart into a pictogram to show what seasonal clothing was worn. • I can use collected data to answer questions.
5	Spr	Earth and Space	• I know that the Sun, Earth and Moon are roughly spherical in shape. • I can describe what the Sun, Earth and Moon are using appropriate vocabulary. • I know that Earth orbits the Sun and the Moon orbits the Earth. • I can describe how the rotation of the Earth creates night and day. • I know that as well as orbiting the Sun, the Earth rotates on its axis, and that it takes one full day (24 hours) for a complete rotation. • I understand why there are different time zones in the world. • I can describe why the length of daylight changes throughout the year. • I know that the tilt of the Earth's axis is what causes the four seasons of the year. • I know that the Northern and Southern Hemispheres experience seasons at different times of year and can explain the reason for this. • I can describe why the Moon appears to change shape throughout a lunar month. • I can describe the different phases of the Moon using appropriate vocabulary. • I can describe what a solar eclipse is and why it occurs. • I can describe how theories about our solar system have changed over time, explaining the difference between geocentric and heliocentric models. • I know that we are in a galaxy called the Milky Way. • I know that there are three main types of planets in our solar system and can describe the difference between terrestrial, gas giant and ice giant planets. • I can name the planets in our solar system and order them by their distance from the Sun. • I know that the length of a year is different on each planet because of the time it takes each one to orbit the Sun.	• I can draw a labelled diagram of the Sun, Earth and Moon to show how they are related to one another. • I can create a moving model of the Sun, Earth and Moon, and write a description to describe what is happening. • I can make a simple sundial and set it up to observe how shadows change throughout the day. • I can record my observations and use these to draw conclusions. • I can use the internet to research which time zones different cities around the world are in. • I can label diagrams to show which season both the Northern and Southern Hemispheres will be experiencing depending on the Earth's position and tilt. • I can create a graph to show the average day length by month, and use the data to answer questions. • I can create a labelled diagram of the phases of the moon. • I can sort fact cards to show which apply to the geocentric and which apply to the heliocentric explanations of the solar system. • I can use the internet to explore the night sky, stating which planets and constellations will be visible on a given day. • I can carry out my own research to find out key facts about each planet in the solar system. • I can create a 3D model of the solar system.

Nursery Objectives

Understanding the World	Understanding the world involves guiding children to make sense of their physical world and their community. The frequency and range of children's personal experiences increases their knowledge and sense of the world around them – from visiting parks, libraries and museums to meeting important members of society such as police officers, nurses and firefighters. In addition, listening to a broad selection of stories, non-fiction, rhymes and poems will foster their understanding of our culturally, socially, technologically and ecologically diverse world. As well as building important knowledge, this extends their familiarity with words that support understanding across domains. Enriching and widening children's vocabulary will support later reading comprehension.					
General theme for half-term (not always linked to each strand)	**All About Me**	**Celebrations**	**Traditional tales**	**Insects & Minibeasts**	**Under the sea**	**Journeys/Moving On**
Natural World	- Talk about what they see in their own environment (school/home – walk around the school environment) - Identify and name: trees, conkers, acorns, leaves, grass, hedge, stones, shells, branches - Investigate and explore natural objects (collected during walk for rubbing/patterns) - Talk about the weather and Autumn	- Talk about different materials/textures and how they feel *(including natural objects e.g. twigs, mud, rocks, sticks, sand, pebbles, leaves)* - Begin to explore what happens when something is frozen/thawed (describe & explore ice) - Use senses to begin explore the difference between liquids and solids (make jelly and talk about what happens)	- Investigate what happens during cooking when different ingredients are combined (baking gingerbread men & porridge – discuss heating/cooling) - Begin to understand the changes that take place during cooking. - Talk about the differences between materials and changes they notice	- Name and identify insects and minibeasts *(including spider, ladybird, butterfly, moth, bee, wasp, slug, beetle, snail, woodlouse)* - Begin to understand the need to respect and care for the natural environment and all living things. - Understand the difference between plants and animals - Understand why and how we look after plants - Plant seeds and care for growing plants *(Gardening week)* - Understand the life cycle of a plant	- Make observations of different sea creatures and discuss how they are different *(make a Rainbow Fish EAD)* - Begin to understand which materials float and sink *(make a boat for Nemo)* - Continue to talk about the differences between materials and changes they notice (freeze small world sea creatures and put in sun) - Explore and talk about different forces they can feel (water pushing boat back up, magnets, push/pull)	- Begin to understand changes in night and day / light and dark / sun and moon *(camping out den activity)* - Understand how we can see in the dark - explore how a torch works - Investigate shadows using torches

Reception Objectives

Understanding the World	Understanding the world involves guiding children to make sense of their physical world and their community. The frequency and range of children's personal experiences increases their knowledge and sense of the world around them – from visiting parks, libraries and museums to meeting important members of society such as police officers, nurses and firefighters. In addition, listening to a broad selection of stories, non-fiction, rhymes and poems will foster their understanding of our culturally, socially, technologically and ecologically diverse world. As well as building important knowledge, this extends their familiarity with words that support understanding across domains. Enriching and widening children's vocabulary will support later reading comprehension.					
General theme for half-term (not always linked to each strand)	**Outside/decay**	**Changes**	**Being healthy**	**Seasons/ environments.**	**Plants & animals**	**Weather/hot/cold**
Natural World	- explore the natural world around them - describe what they see, feel, and hear whilst they are outside - investigate changes over time (cut flowers in different liquids; decay of leaves/plants, fruit/bread) -Explore the changes from summer into Autumn	- explore changes in states of matter including freezing and melting - understand the difference between solids and liquids - look at changes between day/night and light/dark - understand where light comes from (electricity, sun etc)	- understand the importance of healthy eating - explore the affect exercise has on our bodies and why it is so important - understand the importance of good oral hygiene Explore the changes from Autumn into Winter	- identify and compare the different seasons - describe the different types of weather we experience - understand the effect of the changing seasons on the natural world around them -investigate the changing weather by recording the weather over time *Plant seeds this term ready to discuss in Summer term* -Explore the changes from Winter into Spring	- understand the life cycle of a plant and animal (extend from Nursery) - describe how the plants have changed since they were planted in Spring (seeds grow into plants) - name and identify different plants -know vegetables grow in the grow, fruit grows on trees and flour comes from wheat - describe the habitats of different animals - make observations and draw pictures of animals and plants	-investigate the characteristics of materials to decide what to wear to keep cool and warm (link back to weather topic) - identify why the weather affects environments (busy/quiet park/beach) -compare environments including deserts and mountains - recognise some environments that are different to the one in which they live (different weather in different countries) understand what we can do to take care of our environment (recycling/climate change) -Explore the changes from Spring into Summer

Year 1 Objectives	Schemes of Work				
	Identifying Plants	Identifying Animals	My Body	Everyday Materials	Seasonal Changes
asking simple questions and recognising that they can be answered in different ways					
observing closely, using simple equipment					
performing simple tests					
identifying and classifying					
using their observations and ideas to suggest answers to questions					
gathering and recording data to help in answering questions					
identify and name a variety of common wild and garden plants, including deciduous and evergreen trees					
identify and describe the basic structure of a variety of common flowering plants, including trees					
identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals					
identify and name a variety of common animals that are carnivores, herbivores and omnivores					
describe and compare the structure of a variety of common animals (fish, amphibians, reptiles, birds and mammals, including pets)					
identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense					
distinguish between an object and the material from which it is made					
identify and name a variety of everyday materials, including wood, plastic, glass, metal, water, and rock					
describe the simple physical properties of a variety of everyday materials					
compare and group together a variety of everyday materials on the basis of their simple physical properties					
observe changes across the four seasons					
observe and describe weather associated with the seasons and how day length varies					

Year 2 Objectives	Schemes of Work				
	Living in Habitats	Growing Plants	Growth and Survival	Exploring Everyday Materials	Super Scientists
asking simple questions and recognising that they can be answered in different ways					
observing closely, using simple equipment					
performing simple tests					
identifying and classifying					
using their observations and ideas to suggest answers to questions					
gathering and recording data to help in answering questions					
explore and compare the differences between things that are living, dead, and things that have never been alive					
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					
identify and name a variety of plants and animals in their habitats, including microhabitats					
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					
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					
notice that animals, including humans, have offspring which grow into adults					
find out about and describe the basic needs of animals, including humans, for survival (water, food and air)					
describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene					
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, twisting and stretching					

Year 3 Objectives	How Plants Grow	Forces and Magnets	Rocks, Fossils and Soils	Light and Shadow	Health and Movement
asking relevant questions and using different types of scientific enquiries to answer them					
setting up simple practical enquiries, comparative and fair tests					
making systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers					
gathering, recording, classifying and presenting data in a variety of ways to help in answering questions					
recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables					
reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions					
using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions					
identifying differences, similarities or changes related to simple scientific ideas and processes					
using straightforward scientific evidence to answer questions or to support their findings					
identify and describe the functions of different parts of flowering plants: roots, stem/trunk, leaves and flowers					
explore the requirements of plants for life and growth (air, light, water, nutrients from soil, and room to grow) and how they vary from plant to plant					
investigate the way in which water is transported within plants					
explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal					
identify that animals, including humans, need the right types and amount of nutrition, and that they cannot make their own food; they get nutrition from what they eat					
identify that humans and some other animals have skeletons and muscles for support, protection and movement					
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					
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 an opaque object					
find patterns in the way that the size of shadows change					
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					

Year 4 Objectives	Living In Envrionments	Eating and Digestion	States of Matter	Changing Sound	Circuits and Conductors
asking relevant questions and using different types of scientific enquiries to answer them					
setting up simple practical enquiries, comparative and fair tests					
making systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers					
gathering, recording, classifying and presenting data in a variety of ways to help in answering questions					
recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables					
reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions					
using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions					
identifying differences, similarities or changes related to simple scientific ideas and processes					
using straightforward scientific evidence to answer questions or to support their findings					
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					
recognise that environments can change and that this can sometimes pose dangers to living things					
describe the simple functions of the basic parts of the digestive system in humans					
identify the different types of teeth in humans and their simple functions					
construct and interpret a variety of food chains, identifying producers, predators and prey					
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					
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					
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					

Year 5 Objectives	Changes and Reproduction	Properties and Changes of Materials	Earth and Space	Forces in Action	Life Cycles
planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary					
taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate					
recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs					
using test results to make predictions to set up further comparative and fair tests					
reporting and presenting 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					
identifying scientific evidence that has been used to support or refute ideas or arguments					
describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird					
describe the life process of reproduction in some plants and animals					
describe the changes as humans develop to old age					
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, and 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					
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					

Year 6 Objectives	Classifying Organisms	Healthy Bodies	Evolution and Inheritance	Seeing Light	Changing Circuits
planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary					
taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate					
recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs					
using test results to make predictions to set up further comparative and fair tests					
reporting and presenting 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					
identifying scientific evidence that has been used to support or refute ideas or arguments					
describe how living things are classified into broad groups according to common observable characteristics and based on similarities and differences, including microorganisms, plants and animals					
give reasons for classifying plants and animals based on specific characteristics					
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					
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					
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.					
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					

Newall Green Primary School – 'Aiming High To Reach Our Goals'

RISK ASSESSMENT FOR: Science experiments **Completed by:** **Learning Objective:** **Date:**

STEP 1	STEP 2	STEP 3	STEP 4			Step 5
HAZARD	**WHO AFFECTED**	**CONTROL MEASURES**	**RISK/HARM**	**OCCURENCE**	**RISK POTENTIAL**	**Notes**
List the hazards here	**Who may be affected?**	**What further action is necessary to control the risk?** **List the risks, which are not adequately controlled, and the action to be taken where it is reasonably practicable to do more.**				Check against safety sweep.

Risk/Harm	Occurrence	Risk potential (R/H X O)
1 – Trivial	1 – Improbable (probability close to zero)	1-14 – Low (L)
2 – Minor	2 – Possible (remote chance)	15-24 – Medium (M)
3 – Lasting more than 3 days	3 – Occasional (has been known)	25+ - High (H)
4 – Major injury to 1 person	4 – Frequent	
5 – Major injury to several	5 – Regular (3 to 6 months occurrence)	
6 – Death of 1	6 – Common (1 to 3 months occurrence)	
7 – Multiple death	7 – Continuous (daily/weekly event)	

Signed: **Date:**