

Science

Curriculum Plan

National Curriculum from
September 2014



Southridge First School

Purpose of Study: A high-quality science education provides the foundations for understanding the world through the specific disciplines of biology, chemistry and physics. Science has changed our lives and is vital to the world's future prosperity, and all pupils should be taught essential aspects of the knowledge, methods, processes and uses of science. Through building up a body of key foundational knowledge and concepts, pupils should be encouraged to recognise the power of rational explanation and develop a sense of excitement and curiosity about natural phenomena. They should be encouraged to understand how science can be used to explain what is occurring, predict how things will behave, and analyse causes.

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. 'Working scientifically' will be developed further at key stages 3 and 4, once pupils have

built up sufficient understanding of science to engage meaningfully in more sophisticated discussion of experimental design and control.

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.

School curriculum: The programmes of study for science are set out year-by-year for key stages 1 and 2. Schools are, however, only required to teach the relevant programme of study by the end of the key stage. Within each key stage, schools therefore have the flexibility to introduce content earlier or later than set out in the programme of study. In addition, schools can introduce key stage content during an earlier key stage if appropriate. All schools are also required to set out their school curriculum for science on a year-by-year basis and make this information available online.

SCIENCE TEACHING IN KEY STAGE 1: The principal focus of science teaching in key stage 1 is to enable pupils to experience and observe phenomena, looking more closely at the natural and humanly-constructed world around them. They should be encouraged to be curious and ask questions about what they notice. They should be helped to develop their understanding of scientific ideas by using different types of scientific enquiry to answer their own questions, including observing changes over a period of time, noticing patterns, grouping and classifying things, carrying out simple comparative tests, and finding things out using secondary sources of information. They should begin to use simple scientific language to talk about what they have found out and communicate their ideas to a range of audiences in a variety of ways. Most of the learning about science should be done through the use of first-hand practical experiences, but there should also be some use of appropriate secondary sources, such as books, photographs and videos.

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

Pupils should read and spell scientific vocabulary at a level consistent with their increasing word reading and spelling knowledge at KS1.

Working scientifically

Key stage 1 programme of study (statutory requirements)

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.

Pupils in years 1 and 2 should explore the world around them and raise their own questions. They should experience different types of scientific enquiries, including practical activities, and begin to recognise ways in which they might answer scientific questions. They should use simple features to compare objects, materials and living things and, with help, decide how to sort and group them, observe changes over time, and, with guidance, they should begin to notice patterns and relationships. They should ask people questions and use simple secondary sources to find answers. They should use simple measurements and equipment (e.g. hand lenses, egg timers) to gather data, carry out simple tests, record simple data, and talk about what they have found out and how they found it out. With help, they should record and communicate their findings in a range of ways and begin to use simple scientific language. These opportunities for working scientifically should be provided across years 1 and 2 so that the expectations in the programme of study can be met by the end of year 2. Pupils are not expected to cover each aspect for every area of study.

Subject content for Year 1

PLANTS

Pupils should be taught to:

Identify and name a variety of common plants, including garden plants, wild plants and trees, and those classified as deciduous and evergreen.

Identify and describe the basic structure of a variety of common flowering plants, including roots, stem/trunk, leaves and flowers. Pupils should use the local environment throughout the year to explore and answer questions about plants growing in their habitat. Where possible, they should observe the growth of flowers and vegetables that they have planted.

They should become familiar with common names of flowers, examples of deciduous and evergreen trees, and plant structures (trees: trunk, roots, branches, leaves, flowers (blossom), fruit; garden and wild plants: flower, petals, stem, leaves, roots, fruit, bulb and seed).

Pupils might work scientifically by: observing closely, perhaps using magnifying glasses, and comparing and contrasting familiar plants; describing how they were able to identify and group them, drawing diagrams showing the parts of different plants and trees. Pupils might keep records of how plants have changed over time, for example the leaves falling off trees and buds opening; and compare and contrast how different plants change over time.

ANIMALS, INCLUDING HUMANS

Pupils should be taught to:

Identify and name a variety of common animals that are birds, fish, amphibians, reptiles, mammals and invertebrates.

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 (birds, fish, amphibians, reptiles, mammals and invertebrates, and 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.

Pupils should use the local environment throughout the year to explore and answer questions about animals in their habitat.

They should understand how to take care of animals taken from their local environment and the need to return them safely after study.

Pupils should become familiar with common names of birds, fish, amphibians, reptiles, mammals and invertebrates, including pets.

Pupils should have plenty of opportunities to learn the names of the main body parts (including head, neck, arms, elbows, legs, knees, face, ears, eyes, hair, mouth, teeth) through games, actions, songs and rhymes.

Pupils might work scientifically by: using their observations to compare and contrast animals at first hand or through videos and photographs, describing how they identify and group them; grouping animals according to what they eat; and using their senses to compare different textures, sounds and smells.

EVERYDAY MATERIALS

Pupils should be taught to:

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.

Find out how shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching.

Pupils should explore, name, discuss and raise and answer questions about everyday materials so that they become familiar with the names of materials and properties such as: hard/soft; stretchy/stiff; shiny/dull; rough/smooth; bendy/not bendy; waterproof/not waterproof; absorbent/not absorbent.

Pupils should explore and experiment with a wide variety of materials, not only those listed in the programme of study, but including for example: brick, paper, fabrics, elastic, foil.

Pupils find out about people who have developed new materials, for example, John Dunlop, Charles Macintosh or John McAdam.

Pupils might work scientifically by: performing simple tests to explore questions such as: 'What is the best material for an umbrella? ... for lining a dog basket? ... for curtains? ... for a bookshelf? ... for a gymnast's leotard?'

LIGHT

Pupils should be taught to:

Observe and name a variety of sources of light, including electric lights, flames and the Sun.

Associate shadows with a light source being blocked by something.

Pupils should explore materials to raise questions that will help them to understand the differences between materials that are transparent, translucent and opaque (though these words do not need to be used at this stage).

They should observe shadows being formed in everyday contexts, such as when they play outside or shine torches indoors.

Note: Pupils should be warned that it is not safe to look directly at the Sun, even when wearing dark glasses.

Pupils might work scientifically by exploring shiny things and grouping them according to whether they shine in the dark or not.

They can go on a shadow hunt and think about what is similar about the places where shadows are found (that is, that there is a light source and something is blocking it).

SEASONAL CHANGES

Pupils should be taught to:

Observe changes across the four seasons and describe weather associated with the seasons and how day length varies.

Pupils should observe and talk about changes in the weather and the seasons.

Pupils might work scientifically by: making tables and charts about the weather; and making displays of what happens in the world around them, including day length, as the seasons change.

Subject content for Year 2

ALL LIVING THINGS AND THEIR HABITATS

Pupils should be taught to:

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 micro-habitats.

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.

Pupils should be introduced to the idea that all living things have certain characteristics that are essential for keeping them alive and healthy.

They should raise and answer questions that help them to become familiar with the life processes that are common to all living things.

Pupils should be introduced to the terms 'habitat' (a natural environment or home of a variety of plants and animals) and 'micro-habitat' (a very small habitat, for example for woodlice under stones, logs or leaf litter).

They should raise and answer questions about the local environment that help them to identify and study a variety of plants and animals within their habitat and observe how living things depend on each other, for example plants serving as a source of food and shelter for animals.

Pupils should compare animals in familiar habitats with animals found in less familiar habitats, for example, on the seashore, in woodland, in the ocean, in the rainforest.

Pupils might work scientifically by: sorting and classifying things according to whether they are living, dead or were never alive, and recording their findings using charts.

They should describe how they decided where to place things, exploring questions such as: 'Is a flame alive? Is a deciduous tree dead in winter?' and talk about ways of answering their questions.

They could construct a simple food chain that includes humans (e.g. grass, cow, human); describing the conditions in different habitats and micro-habitats (under log, on stony path, under bushes); finding out how the conditions affect the number and type(s) of plants and animals that live there.

PLANTS

Pupils should be taught to:

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.

Pupils should use the local environment throughout the year to observe how plants grow (including seeds, bulbs, fruit and vegetables, deciduous and evergreen bushes and trees).

Pupils should be introduced to the requirements of plants for growth and survival, as well as the process of reproduction and growth in plants.

Note: Seeds and bulbs need water to grow but do not need light; seeds and bulbs have a store of food inside them.

Pupils might work scientifically by: observing and recording, with some accuracy, the growth of a variety of plants as they change over time from a seed or bulb, or observing similar plants at different stages of growth; setting up a comparative test to show that plants need light and water to stay healthy.

ANIMALS, INCLUDING HUMANS

Pupils should be taught to:

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.

Pupils should be introduced to the basic needs of animals for survival, as well as the importance of exercise and nutrition for humans.

They should also be introduced to the processes of reproduction and growth in animals.

The focus at this stage should be on questions that help pupils to recognise growth; they should not be expected to understand how reproduction occurs. The following examples might be used: egg, chick, chicken; egg, caterpillar, pupa, butterfly; spawn, tadpole, frog; lamb, sheep.

Growing into adults can include reference to baby, toddler, child, teenager, adult.

Pupils might work scientifically by: observing, through video or first-hand observation and measurement, how different animals, including humans, grow; asking questions about what things animals need for survival and what humans need to stay healthy; and suggesting ways to find answers to their questions.

USES OF EVERYDAY MATERIALS

Pupils should be taught to:

Identify and compare the uses of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard.

Compare how things move on different surfaces.

Pupils should identify and discuss the uses of different everyday materials so that they become familiar with how some materials are used for more than one thing (metal can be used for coins, cans, cars and table legs; wood can be used for matches, floors, and telegraph poles) or different materials are used for the same thing (spoons can be made from plastic, wood, metal, but not normally from glass; tables can be made from plastic, wood, metal, but not normally from paper).

Pupils might work scientifically by: comparing the uses of everyday materials in and around the school with materials found in other places (at home, the journey to school, on visits, and in stories, rhymes and songs); observing closely, identifying and classifying the uses of different materials, and recording their observations.

Pupils should be encouraged to think about unusual and creative uses for everyday materials.

They could ask questions about the movement of objects such as toy cars on different surfaces; comparing them, by measuring how far they go; ordering their findings and recording their observations and measurements, for example by constructing tables and charts, and drawing on their results to answer their questions.

SOUND

Pupils should be taught to:

Observe and name a variety of sources of sound, noticing that we hear with our ears

Recognise that sounds get fainter as the distance from the sound source increases.

Linked with work in music, pupils should explore various ways of making sounds, for example using a range of musical instruments to make louder and softer and higher and lower sounds.

Pupils might work scientifically by: comparing different sound sources and looking for patterns; carrying out tests to find the best places to locate fire bells in school.

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

During years 3 & 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

Pupils in years 3 and 4 should be given a range of scientific experiences to enable them to raise their own questions about the world around them.

- They should start to make their own decisions about the most appropriate type of scientific enquiry they might use to answer questions; recognise when a simple fair test is necessary and help to decide how to set it up; talk about criteria for grouping, sorting and classifying; and use simple keys.
- They should begin to look for patterns and decide what data to collect to identify them.
- They should help to make decisions about what observations to make, how long to make them for and the type of simple equipment that might be used.
- They should learn how to use new equipment, such as data loggers, appropriately.
- They should collect data from their own observations and measurements, using notes, simple tables and standard units, and help to make decisions about how to record and analyse this data.
- With help, pupils should look for changes, patterns, similarities and differences in their data in order to draw simple conclusions and answer questions.
- With support, they should identify new questions arising from the data, making predictions for new values within or beyond the data they have collected and finding ways of improving what they have already done.
- They should also recognise when and how secondary sources might help them to answer questions that cannot be answered through practical investigations. Pupils should use relevant scientific language to discuss their ideas and communicate their findings in ways that are appropriate for different audiences.
- These opportunities for working scientifically should be provided across years 3 and 4 so that the expectations in the programme of study can be met by the end of year 4.
- Pupils are not expected to cover each aspect for every area of study.

Subject content for Year 3

PLANTS

Pupils should be taught to:

Identify and describe the functions of different parts of flowering plants: roots, stem, 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.

Pupils should be introduced to the relationship between structure and function: the idea that every part has a job to do. They should explore questions that focus on the role of the roots and stem in nutrition and support, leaves for nutrition and flowers for reproduction.

Note: Pupils can be introduced to the idea that plants can make their own food, but at this stage they do not need to understand how this happens.

Pupils might work scientifically by: comparing the effect of different factors on plant growth, for example the amount of light, the amount of fertiliser; discovering how seeds are formed by observing the different stages of plant life cycles over a period of time; looking for patterns in the structure of fruits that relate to how the seeds are dispersed.

They might observe how water is transported in plants, for example by putting cut, white carnations into coloured water and observing how water travels up the stem to the flowers.

ANIMALS, INCLUDING HUMANS

Pupils should be taught to:

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 animals have skeletons and muscles for support, protection and movement.

Pupils should continue to learn about the importance of nutrition (including a balanced diet) and should be introduced to the main body parts associated with the skeleton and muscles, finding out how different parts of the body have special functions.

Pupils might work scientifically by: identifying and grouping animals with and without skeletons and observing and comparing their movement; exploring ideas about what would happen if humans did not have skeletons.

They might compare and contrast the diets of different animals (including their pets) and decide ways of grouping them according to what they eat.

They might research different food groups and how they keep us healthy and design meals based on what they find out.

ROCKS

Pupils should be taught to:

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.

Linked with work in geography, pupils should explore different kinds of rocks and soils, including those in the local environment.

Pupils might work scientifically by: observing rocks, including those used in buildings and gravestones, and exploring how and why they might have changed over time; using a hand lens or microscope to help them to identify and classify rocks according to whether they have grains or crystals, and whether they have fossils in them.

Pupils might research and discuss the different kinds of living things whose fossils are found in sedimentary rock and explore how fossils are formed.

Pupils could explore different soils and identify similarities and differences between them and investigate what happens when rocks are rubbed together.

They can raise and answer questions about the way soils are formed.

LIGHT

Pupils should be taught that:

Notice that light is reflected from surfaces.

Find patterns that determine the size of shadows.

Pupils should explore what happens when light reflects off a mirror or other reflective surfaces, including playing mirror games to help them to answer questions about how light behaves.

Note: Pupils should be warned that it is not safe to look directly at the Sun, even when wearing dark glasses.

Pupils might work scientifically by: looking for patterns in what happens to shadows when the light source moves or the distance between the light source and the object changes.

FORCES AND MAGNETS

Pupils should be taught to:

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.

Pupils should observe that magnetic forces can act without direct contact, unlike most forces, where direct contact is necessary

(for example, opening a door, pushing a swing).

They should explore the behaviour and everyday uses of different magnets (for example, bar, ring, button and horseshoe).

Pupils might work scientifically by: exploring the strengths of different magnets and finding a fair way to compare them; sorting materials into those that are magnetic and those that are not; looking for patterns in the way that magnets behave in relation to each other and what might affect this, such as the strength of the magnet or which pole faces another; identifying how these properties make magnets useful in everyday items and suggesting creative uses for different magnets.

Subject content for Year 4

ALL LIVING THINGS

Pupils should be taught to:

Identify and name a variety of living things (plants and animals) in the local and wider environment, using classification keys to assign them to groups.

Recognise that environments can change and that this can sometimes pose dangers to living things.

Pupils should use the local environment throughout the year to raise and answer questions that help them to identify and study plants and animals in their habitat; and how the habitat changes throughout the year.

Pupils should begin to put vertebrate animals into groups such as fish, amphibians, reptiles, birds, and mammals; and invertebrates into snails and slugs, worms, spiders, and insects.

Note: Plants are more difficult to classify, but can be grouped into categories such as flowering plants (including grasses) and non-flowering plants such as ferns and mosses.

Pupils should explore examples of human impact (both positive and negative) on environments such as the positive effects of nature reserves, ecologically planned parks, or garden ponds, and the negative effects of population and development, litter or deforestation.

Pupils might work scientifically by: exploring local small invertebrates and using guides or keys to identify them; making a guide to local living things; raising and answering questions based on their observations of animals and what they have found out about other animals that they have researched.

ANIMALS, INCLUDING HUMANS

Pupils should be taught to:

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.

Pupils should be introduced to the main body parts associated with the digestive system, such as mouth, tongue, teeth, oesophagus, stomach and intestine and explore questions that help them to understand their special functions.

Pupils might work scientifically by: comparing the teeth of carnivores and herbivores, and suggesting reasons for differences; finding out what damages teeth and how to look after them.

They might draw and discuss their ideas about the digestive system and compare them with models or images.

STATES OF MATTER

Pupils should be taught to:

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 ($^{\circ}\text{C}$).

Identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature.

Pupils should explore a variety of everyday materials and develop simple descriptions of the states of matter (solids hold their shape; liquids form a pool not a pile; gases escape from an unsealed container).

Pupils should observe water as a solid, a liquid and a gas and should note the changes to water when it is heated or cooled.

Note: Teachers should avoid using materials where heating is associated with chemical change, for example, through baking or burning.

Pupils might work scientifically by: grouping and classifying a variety of different materials; exploring the effect of temperature on substances such as chocolate, butter, cream (for example, to make food such as chocolate crispy cakes and ice-cream for a party).

They could research the temperature at which materials change state, such as when iron melts or when oxygen condenses, using and applying what they have learnt in mathematics.

They might observe and record evaporation over a period of time, such as a puddle in the playground or washing on a line, and investigate the effect of temperature on washing drying or snowmen melting.

SOUND

Pupils should be taught to:

Identify how sounds are made, associating some of them with something vibrating.

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.

Pupils should explore and identify the way sound is made through vibration in a range of different musical instruments from around the world; and find out how the pitch and volume of sounds can be changed in a variety of ways.

Pupils might work scientifically by: finding patterns in the data (for example, blowing across the top of bottles, changing the length and thickness of elastic bands).

They might make earmuffs from a variety of different materials to investigate which provides the best insulation against sound.

They could make and play their own instruments by using what they have found out about pitch and volume.

ELECTRICITY

Pupils should be taught to:

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.

Pupils should construct simple series circuits, trying different components, such as bulbs, buzzers and motors, and including switches, and use their circuits to create simple devices.

Pupils should draw the circuit as a pictorial representation, not necessarily using conventional circuit symbols at this stage; these will be introduced in year 6.

Note: Pupils might use the terms current and voltage, but these should not be introduced or defined formally at this stage.

Pupils should be taught about precautions for working safely with electricity.

Pupils might work scientifically by: observing patterns, for example that bulbs get brighter if more cells are added, that metals tend to be conductors of electricity, and that some materials can and some cannot be used to connect across a gap in a circuit.

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

Year 1

Autumn 1

Jurassic Forest

Dinosaur Investigations

This unit allows the children to roleplay a group of paleontologists on the hunt for evidence of dinosaurs and their habitats which can then be used in a new Jurassic Park-styled theme park.

- Recognise and name external parts of animals
- Sort living things into groups, using simple features
- Know what living things do
- What animals need to live
- Know what happens to an animal when we change amounts of the food, water and air
- Know the conditions a dinosaur needs to survive
- Work out how a dinosaur is suited to where it lives
- Ask simple questions and recognise that they can be answered in different ways
- Observe closely, use simple equipment, perform simple tests, identify and classify
- Use their observations and ideas to suggest answers to questions, gather and record data to help in answering questions
- Use bar charts/tables to record evidence

Seasons (ongoing throughout Year)

- Observe changes across the four seasons
- Observe and describe weather associated with the seasons and how day length varies

Autumn 2 Welcome to Pirate Island	Use of Everyday Materials • 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 • To be able to identify and classify • To be able to observe carefully, using simple equipment • To be able to ask simple questions and recognise that they can be answered in different ways • To be able to perform simple tests • To be able to record simple data in order to answer a question • To be able to make simple measurements with equipment (non-statutory)
Spring 1 Amazing Animals	Animals including humans • 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 • Record data in a table • Observe closely, using simple equipment • Record data in simple ways (Venn diagram/chart) • Sort and group animals with some help (non-statutory)

Spring 2 Growing	Plants ● 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 ● Observe closely using simple equipment ● Ask simple questions and recognise that they can be answered in different ways ● Use parts of the plant to identify and classify it ● Use simple features of a plant to sort and group them (non-statutory)
Summer 1 Castles	Seasons (ongoing throughout Year) ● Observe changes across the four seasons ● Observe and describe weather associated with the seasons and how day length varies ● Ask simple questions and recognise that they can be answered in different ways ● Perform simple tests ● Observe closely, using simple equipment ● Gather and record data to help answer a question
Summer 2 Explorers	Fairytale Investigations ● Ask simple questions and recognise that they can be answered in different ways ● Observe closely, use simple equipment, perform simple tests, identify and classify ● Use their observations and ideas to suggest answers to questions, gather and record data to help in answering questions

Year 2

Autumn 1

Living Things and their Habitats

Beside the Seaside

- 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
- 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
- Identify and name a variety of plants and animals in their habitats, including micro-habitats
- Ask simple questions and recognise that they can be answered in different ways
- Observe closely
- Gather and record data to help answer a question
- Record data in a tally chart
- Record data in a bar chart
- Use observations to suggest answers to questions
- Observe using a microscope/hand lens

Autumn 2 Fireworks	Use of Everyday Materials ● 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 ● Ask simple questions and recognise that they can be answered in different ways ● Use observations and ideas to suggest answers to questions ● Gather and record data to help in answering questions ● Perform simple tests ● Gather and record data to help in answering questions ● Use simple measurements to gather data ● Use simple secondary sources to find answers (non-statutory) ● Talk about what they have found out and how they found it out (non-statutory) ● With help, notice relationships (non-statutory)
Spring 1 Living on an island	Weather and Seasons ● Observe changes across the four seasons ● Observe and describe weather associated with the seasons and how day length varies ● Ask simple questions and recognise that they can be answered in different ways ● Identify objects ● Perform simple tests ● Observe closely, using simple equipment ● Gather and record data to help answer a question ● Animals Including humans

Spring 2 Local Heroes	Animals Including humans ● 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 ● Use observations to suggest answers to questions ● Record data (flow diagram) ● Observe using simple equipment ● Record data (table) ● Perform a simple test ● Record data (tally chart)
Summer 1 Take a trip around the World	Plants ● 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 ● Perform a simple test ● Recognise that questions can be answered in a range of ways ● Observe closely using simple equipment ● Sort objects using observable features (non-statutory) ● Gather and record data to help in answering a question ● Use their observations and ideas to suggest answers to questions

Summer 2 Wheels, Wings and other Things	Electricity ● 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 ● Alternative sources of energy ● Set up a simple practical enquiry ● Record findings using drawings ● Use results to make predictions
--	---

Year 3

Autumn 1	Light
How did life change for children in World War 2?	● Recognise that they need light in order to see things and that dark is the absence of light ● Notice that light is reflected from surfaces ● Recognise that light from the sun can be dangerous and that there are ways to protect their eyes ● Recognise that shadows are formed when the light from a light source is blocked by a solid object ● Find patterns in the way that the size of shadows change ● Set up a simple fair test. ● Make systematic and careful observations and measurements. ● Record findings as drawings. ● Record findings as a bar chart. ● Make predictions for further values
Autumn 2	Forces and Magnets
Where are we in the world?	● 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. ● Set up a simple fair-test. ● Record findings in a bar chart. ● Identify changes related to scientific ideas. ● Use results to draw simple conclusions. ● Provide an oral explanation of findings. ● Make systematic and careful observations

Spring 1 Who first lived in Britain?	Rocks • Compare and group together different kinds of rocks on the basis of their appearance and simple physical properties • Relate the properties of rocks with their uses • 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. • Make careful observations. • Set up simple comparative tests • Measure using beakers and syringes. • Present information in a branching key. • Use presentations to report on findings from enquiries
Spring 2 What makes the earth angry?	Plants • 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 • Set up a simple practical enquiry • Make systematic and careful observations • Gather and record data • Use results to draw simple conclusions • Use straightforward scientific evidence to answer questions or to support their findings

Summer 1 Why were the Romans so powerful and what did we learn from them?	Animals Including Humans ● 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 ● Record using drawings. ● Report on findings from enquiries. ● Use evidence to answer questions. ● Set up a comparative test. ● Record data in a table. ● Identify the correct type of enquiry to answer a question. ● Record data in a scatter graph
Summer 2 What is life like in France?	Mission Incredible This unit allows the children an opportunity to develop and apply their scientific skills and build on prior knowledge. The children are to take the role of a special agent. The mission is to capture and return a secret formula! ● Make accurate measurements. ● Repeat measurements when required. ● Select equipment to address a question. ● Identify patterns in observations and use these to draw conclusions. ● Identify patterns in results in different formats (e.g. bar and line graphs) ● Explain differences in repeated measurements. ● Use scientific evidence to draw conclusions. ● Find patterns in results. ● Draw conclusions from data shown in a line graph. ● Evaluate the methods used throughout the previous science investigations. ● Draw conclusions from all the scientific evidence.

Year 4

Autumn 1	Sound
Ancient Egypt	● 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 ● Use a scientific enquiry to answer a question ● Set up a simple practical enquiry ● Make systematic and careful measurements with a data logger ● Report on findings from an enquiry ● Identify differences, similarities or changes related to simple scientific ideas ● Set up simple fair tests
Autumn 2	States of Matter
The Water Cycle and Rivers	● 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 ● Set up a fair test ● Set up a simple test ● Use results to draw simple conclusions ● Use a data logger to take accurate measurements ● Use a thermometer to take accurate measurements ● Provide a written explanation ● Use straightforward scientific evidence to answer questions or to support their findings

Spring 1 The Rainforest	All living things and their Habitats ● 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. ● Gather, record, classify and present data in a variety of ways to help in answering questions. ● Report on findings from enquiries, including oral and written explanations. ● Gather, record, classify and present data in a variety of ways to help in answering questions. ● Report on findings from enquiries, including oral and written explanations.
Spring 2 Producers, Predators and Prey	Animals Including Humans ● Nutrition and Digestion: ● 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 ● Food chains - construct and interpret a variety of food chains, identifying producers, predators and prey. ● Record findings using labelled diagrams ● Use written explanations to report on findings from an enquiry ● Identify the correct type of enquiry to answer a question ● Set up a comparative test ● Use evidence to support findings

Summer 1 Great Victorians	Electricity • 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 • Take repeat measurements of data with precision using a data-logger. • Explain the degree of trust can be had in results. • Plan a fair-test by recognising the control variables. • Use predictions to set up fair tests.
Summer 2 Why is Newcastle such a great place to live?	Crime Scene Investigators This unit allows the children an opportunity to develop and apply their scientific skills and build on prior knowledge. The children are to take the role of a crime scene investigator. • Make accurate measurements. • Repeat measurements when required. • Select equipment to address a question. • Identify patterns in observations and use these to draw conclusions. • Identify patterns in results in different formats (e.g. bar and line graphs) • Explain differences in repeated measurements. • Use scientific evidence to draw conclusions. • Find patterns in results. • Draw conclusions from data shown in a line graph. • Evaluate the methods used throughout the previous science investigations. • Draw conclusions from all the scientific evidence.