Southway Junior School

SCIENCE Curriculum

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.

LOWER KEY STAGE 2 Curriculum

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

LOWER KEY STAGE 2

- 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 Curriculum

The principal focus of science teaching in upper key stage 2 is to enable pupils to **develop a deeper understanding** of a wide range of scientific ideas. They should do this through exploring and talking about their ideas; **asking their own questions** about scientific phenomena; and analysing functions, relationships and interactions **more systematically**. At upper key stage 2, they should encounter **more abstract ideas** and begin to recognise how these ideas help them to **understand** and **predict how the world operates**. They should also begin to recognise that **scientific ideas change and develop over time**. They should select the most appropriate ways to answer science questions using different types of **scientific enquiry**, including observing changes over different periods of time, noticing patterns, grouping and classifying things, carrying out comparative and fair tests and finding things out using a wide range of secondary sources of information. Pupils should draw **conclusions** based on their data and observations, use **evidence** to justify their ideas, and use their scientific knowledge and understanding to **explain their findings**.

'Working and thinking scientifically' is described separately at the beginning of the programme of study, but must always be taught through and clearly related to substantive science content in the programme of study. Pupils should read, spell and pronounce **scientific vocabulary** correctly.

UPPER KEY STAGE 2

- 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**.

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"Learning and Achieving Together"

SCIENCE curriculum map

Year group	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
Year 3	**Me and My World** Plants	**Me and My World** Living things and their habitats	**Invaders & Raiders** Animals, including humans – teeth and healthy eating	**Invaders & Raiders** Animals, including humans – The skeleton	**Battles and Bangs** Rocks and soils	**Battles and Bangs** Rocks and soils
Year 4	**Victorian Towns and Twisted Tales** Electricity, Forces and Magnets	**Victorian Towns and Twisted Tales** Electricity, Forces and Magnets	**Mysterious Maya** Light	**Mysterious Maya** Light	**To Infinity and Beyond** States of matter, Earth and space	**To Infinity and Beyond** States of matter, Earth and space
Year 5	**Power and Palaces** Sound	**Power and Palaces** Sound	**We'll Meet Again** Properties and changes of materials	**We'll Meet Again** Properties and changes of materials	**Seas, Storms & Survival** Living things and their habitats	**Seas, Storms & Survival** Living things and their habitats
Year 6	**Frozen in Time** Forces	**Frozen in Time** Evolution and inheritance, Animals, including humans – Food chain	**Walk Like an Egyptian** Light	**Walk Like an Egyptian** Electricity	**Blood, Bones and Body Bits** Animals including humans – growth, life cycles, healthy living	**Blood, Bones and Body Bits** Animals including humans – growth, life cycles, healthy living

Curriculum Progression

SCIENCE – SC1: SCIENTIFIC ENQUIRY Progression

Foci	Year 3	Year 3 / Year 4	Year 4 / Year 5	Year 5 / Year 6	Year 6 G. Depth
Scientific question (Plan)	With help, suggest how to find the answer to simple questions given by their teacher.	With help, come up with own ideas about what to investigate.	Independently, put forward sensible ideas about what to investigate.	Using scientific language, come up with questions one could investigate.	
Method & equipment (Plan)	With help, make some suggestions about how to find things out. Choose the best method from those provided.	Independently, suggest ways of doing the investigation. Suggest the advantages of working together for the investigation. Choose the correct equipment provided.	Write an appropriate method to answer the question. Independently, say what equipment they need. Describe how equipment will be used.	Come up with different ways to carry out the investigation. Choose the best method and say why it is best. Explain how working with others may improve the results. Explain why they are using different equipment.	
Fair test (Plan)	With help, say if the method is fair or not.	From the list provided b, select things they will keep the same.	Say why they need to do a fair test. List all the things (variables) they will keep the same. Say what thing they will change (vary).	Explain why they have chosen to investigate a certain variable.	Explain how it is a fair test using the terms independent and dependent variables.

Foci	Year 3	Year 3 / Year 4	Year 4 / Year 5	Year 5 / Year 6	Year 6 G. Depth
Design results table (Plan)	With help, identify things to measure or observe.	Suggest how to record information.	Select the best recording method from those suggested. Design own basic results table.	Decide how many times to repeat observations. Design own results table to include different units of measure.	Say how many times and why they are repeating observations. Decide and justify the detail of data being collected.
Make prediction (Plan)	Suggest what might happen and where they have seen this before.	Suggest what might happen and why.	Make a prediction using scientific language and an 'er/er' statement.	Make a prediction including estimated results.	
Start observing (Observe & do)	With help, describe observations using simple scientific words.	Independently, make accurate observations (words & pictures)	Make observations (words, pictures & ICT) that they think will be useful.	Repeat observations (using words, pictures, ICT) until they are happy with my results.	
Safely use equipment (Observe & do)	Follow instructions in order to stay safe. Work together and say how others help. Correctly use equipment provided.	With support, say what possible dangers are. Choose from equipment provided; use it safely and accurately.	Independently, say what possible dangers are. Independently, say what equipment they need and use it correctly.	Say how they will avoid the dangers to one's self and others in the investigation.	Independently, write a set of safety rules.
Take measurements (Observe & do)	Take simple measurements	Take accurate whole number measurements (e.g. 7 cm).	Take sets of detailed measurements (e.g. 72mm or 7.2cm)	Repeat sets of measurements. Accurately take a combination of different units of measure.	
Record results (Observe & do)	Record findings on tables provided by my teacher.	Put results (numbers & words) in the table provided.	Record results accurately on their own table.	Record different units of measure accurately	

Foci	Year 3	Year 3 / Year 4	Year 4 / Year 5	Year 5 / Year 6	Year 6 G. Depth
Start observing (Observe & do)	With help, describe observations using simple scientific words.	Independently, make accurate observations (words & pictures)	Make observations (words, pictures & ICT) that they think will be useful.	Repeat observations (using words, pictures, ICT) until they are happy with my results.	
Safely use equipment (Observe & do)	Follow instructions in order to stay safe. Work together and say how others help. Correctly use equipment provided.	With support, say what possible dangers are. Choose from equipment provided; use it safely and accurately.	Independently, say what possible dangers are. Independently, say what equipment they need and use it correctly.	Say how they will avoid the dangers to one's self and others in the investigation.	Independently, write a set of safety rules.
Take measurements (Observe & do)	Take simple measurements	Take accurate whole number measurements (e.g. 7 cm).	Take sets of detailed measurements (e.g. 72mm or 7.2cm)	Repeat sets of measurements. Accurately take a combination of different units of measure.	
Record results (Observe & do)	Record findings on tables provided by my teacher.	Put results (numbers & words) in the table provided.	Record results accurately on their own table.	Record different units of measure accurately.	
Present results (Conclude)	Present results as simple tables, block graphs and pictograms.	Present data (numbers) in tables & bar charts.	Present data (numbers) in the most appropriate table, bar chart or graph.	Put data into appropriate table, bar chart or line graphs for continuous variables (e.g. time). Present information in a variety of ways including diagrams, drawings & ICT.	Work out averages from data and use this within graphs and results. Compare results to others.
Identify important information (Conclude)	Say what happened in the investigation.	Recognise simple patterns in observations (what I saw) or in data (numbers) in tables, pie or bar charts.	Recognise simple patterns in data.	Accurately describe patterns in results. Identify if certain results (or repeated observations) do not follow the pattern or are different.	Explain why certain results (or repeated observations) do not follow the pattern or are different. Explain if their results are reliable.

Foci	Year 3	Year 3 / Year 4	Year 4 / Year 5	Year 5 / Year 6	Year 6 G. Depth
Explain conclusions (Conclude)	Use observations and ideas to answer questions from the teacher. Use simple scientific words to describe findings. With help, say whether what happened was what they expected. Say if anything was different happened.	Independently, use results to answer the original question. With help, make an 'er/er' statement. Use simple scientific words / symbols / units. Draw a simple diagram with some labels.	Independently, draw simple conclusions from results and make an 'er/er' statement. Say which results have helped make a conclusion. Use correct scientific words / symbol / units. Compare the results with their prediction. Draw a simple diagram or model with labels and a basic explanation of what is happening.	Make a conclusion that uses more than one piece of evidence, including numerical data and/or line graphs. Show workings for their calculations, including correct scientific or mathematical symbols. Independently, compare their results to my prediction. Use a scientific diagram or model with clear explanations. Make other predictions from their results.	Make detailed conclusions that fit the pattern of their results. Explain all scientific terminology they use with increased accuracy. Identify the most important aspects of any scientific diagrams and any limitations they may have.
Suggest improvements (Conclude)	With help, suggest different ways they could have done things.	Independently, suggest improvements to their method.	Suggest improvements to their method and say why.	Say how accurate their results are and how they could have been improved.	Use results data to reason how their method could be improved.
So what? (Conclude)	Say how this science could be useful or harmful. Say who uses their science to help others.	Suggest a technology that could use or uses this science. Explain how a certain technology uses the science. Say how this science affects our lives.	Describe how technologies using this science could be useful and/or harmful. Say where is this science used in real-life. Say where is this science used in jobs.	Explain how different technologies use this science.	Explain how the science they investigated helps particular job and/or the economy. Explain where in the world this science helps or affects different people or places.

Resources to Support

SCIENCE Curriculum
WEBSITES ▪ …
BOOKS ▪ …
PHYSICAL RESOURCES ▪

	Autumn Term	Spring Term	Summer Term
Year 3	**Me and My World** Year 3 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. Year 4 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. Possible spring?	**Invaders and Raiders** Year 3 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. Year 4 Animals, including humans • 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	**Battles and Bangs** Year 3 Rocks and soils • 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.
Year 4	**Victorian Towns and Twisted Tales** Year 4 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.	**Mysterious Maya** Year 3 light • 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.	**To Infinity and Beyond** Year 4 states of matter • 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 Year 5 Earth and space • 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

	Year 3 Forces and Magnets • 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.		• 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.
Year 5	**Power and Palaces** Year 4 sound • 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.	**Sea, Storms and Survival** Year 5 Properties and changes of materials • 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.	**Glorious Greeks** Year 5 Living things and their habitats • 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. Year 6 Living things and their habitats • 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.

Year 6	**Frozen in Time** Year 6 Evolution and inheritance • 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. Year 4 Animals, including humans • construct and interpret a variety of food chains, identifying producers, predators and prey. Year 5 Forces • 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 3 Forces and magnets • compare how things move on different surfaces	**Walk Like An Egyptian** Year 6 Light • recognise that light appears to travel in straight lines • use the idea that light travels in straight lines to explain that objects are seen because they give out or reflect light into the eye • explain that we see things because light travels from light sources to our eyes or from light sources to objects and then to our eyes • use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them. Year 6 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. •	**Blood, Bones and Body Bits** Year 6 Animals including humans • 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. Year 5 Animals, including humans • describe the changes as humans develop to old age.

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Foundation enquiry vocabulary progression

Vocabulary Progression

Basic / beginning	Years 1 & 2	Recognise Identify Describe Observe Select Categorise Classify Sequence Compare and contrast Recall Reason/speculate
Developing	Years 3 & 4	Summarise Synthesise Explain Demonstrate understanding
Specialised	Years 5 & 6	Empathise Reach informed conclusions Make reasoned judgements Justify Apply Evaluate Critique Hypothesise