

Hampton Vale Primary Academy

Science Curriculum

Our Rationale

Our Science teaching is designed to empower children with knowledge about themselves, their world and the impact they are having on it. We aim to harness children's natural curiosity and engage them in meaningful, real-life learning.

We teach five strands; **Biology, Physics, Chemistry, Working Scientifically and Science in Context**. Through the first 3 knowledge strands children are taught how to work scientifically and what the relevance of their science learning is, ensuring holistic learning. Each year group has 6 units that build upon prior knowledge and ensure progression across the school. Retrieval forms a crucial role in our Science curriculum, ensuring knowledge is never lost.

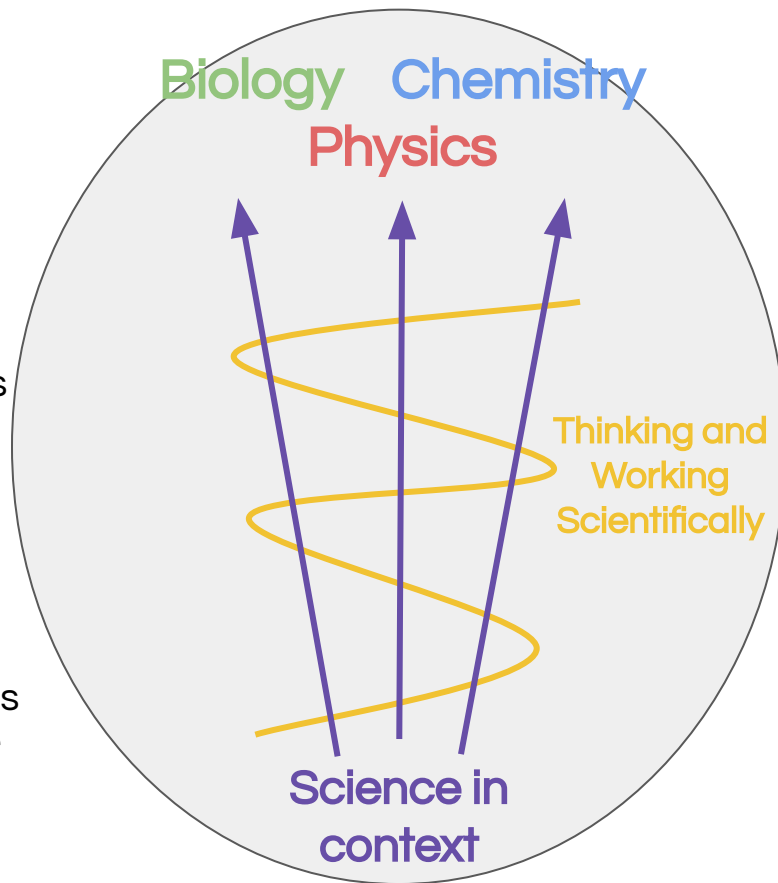
As well as being knowledge rich, our curriculum takes children's learning from that which is abstract to that which is relevant and meaningful. We enhance children's cultural capital by exposing them to the real world of Science; looking at current day scientific developments and real scientists, both modern and historical.

Science Curriculum Overview

What will our students learn?

Our curriculum covers 5 main strands that work together so that we can teach holistically.

- ❖ **Biology** - living things and how they interact.
- ❖ **Physics** - the interaction of matter and energy.
- ❖ **Chemistry** - properties and changes of materials and substances.
- ❖ **Thinking and Working Scientifically** - develops understanding and skills of scientific models, scientific enquiry and practical investigations.
- ❖ **Science in context** - 'Real Science' which ensures pupils understand the relevance of their science learning.



Strands & Concepts

Biology

Plants

Living things and their habitats

Animals, including humans.

Evolution and their inheritance.

Physics

Seasonal Changes

Earth and Space

Sound

Forces and Magnets

Light

Electricity

Chemistry

Materials

State of Matter

Rocks

Science in Context: Real Science

Thinking and Working Scientifically

Coverage

	Unit 1	Unit 2	Unit 3	Unit 4	Unit 5	Unit 6
Year 1	Animals (inc humans) - Animals	Everyday Materials 1	Animals (inc humans) - Humans	Everyday Materials 2	Plants	Seasonal Changes
Year 2	Everyday Materials	Animals (inc Humans) - Growth	Living Things & Their Habitats	Plants	Animals (inc humans) - Life Cycles	Living Things & Their Habitats - Around the world
Year 3	Light & Shadow	Animals (inc Humans)	Forces & Magnets	Rocks & Soil	Plants	Scientific Enquiry
Year 4	Living Things & Their Habitats	States of Matter	Animals (inc Humans)	Electricity	Living Things & Their Habitats - conservation	Sounds
Year 5	Living Things & Their Habitats	Properties of Materials	Earth & Space	Animals (inc Humans)	Changes of Materials	Forces
Year 6	Living Things & Their Habitats	Electricity	Evolution & Inheritance	Light	Animals (inc Humans)	Look after our Environment

Progression

Biology						
Year Group	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Plants	✓	✓	✓		✓	
Living things and their habitats		✓		✓	✓	✓
Animals (including humans)	✓	✓	✓	✓	✓	✓
Evolution inheritance.						✓

Topic Progression

Biology - Plants

Year 1	<ul style="list-style-type: none">• Identify and describe the basic structure of a variety of common flowering plants, including trees.• Identify and name a variety of common wild and garden plants, including deciduous and evergreen trees
Year 2	<ul style="list-style-type: none">• Find out and describe how plants need water, light and a suitable temperature to grow and stay healthy• Observe and describe how seeds and bulbs grow into mature plants
Year 3	<ul style="list-style-type: none">• Identify and describe the functions of different parts of flowering plants: roots, stem/trunk, leaves and flowers• Explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal• 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
Year 4	
Year 5	
Year 6	

Topic Progression

Biology - Living things and their habitats

Year 1

Year 2

- **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.

Year 3

Year 4

- **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

Year 5

- **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

- **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.

Topic Progression

Biology - Animals (including Humans)

Year 1	<ul style="list-style-type: none">• 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
Year 2	<ul style="list-style-type: none">• 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
Year 3	<ul style="list-style-type: none">• 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	<ul style="list-style-type: none">• 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
Year 5	<ul style="list-style-type: none">• Describe the changes as humans develop to old age
Year 6	<ul style="list-style-type: none">• Identify and name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood• describe the ways in which nutrients and water are transported within animals, including humans.• recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function

Topic Progression

Biology - Evolution & Inheritance

Year 1

Year 2

Year 3

Year 4

Year 5

Year 6

- **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.

Physics

Year Group	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Seasonal Changes	✓					
Earth and Space					✓	
Light			✓			✓
Sound				✓		
Forces and Magnets			✓		✓	
Electricity				✓		✓

Topic Progression

Physics - Seasonal Changes and Earth & Space

Year 1

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

Year 2

Year 3

Year 4

Year 5

- **Describe** the movement of the Earth, and other planets, relative to the Sun in the solar system
- **Describe** the Sun, Earth and Moon as approximately spherical bodies
- **Describe** the movement of the Moon relative to the Earth
- Use the idea of the Earth's rotation to **explain** day and night and the apparent movement of the sun across the sky

Year 6

Topic Progression

Physics - Light & Shadow

Year 1

Year 2

Year 3

- **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

Year 4

Year 5

Year 6

- **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.

Topic Progression

Physics - Sound

Year 1

Year 2

Year 3

Year 4

- **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.

Year 5

Year 6

Topic Progression

Physics - Forces & Magnets

Year 1

Year 2

Year 3

- **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

Year 5

- **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

Topic Progression

Physics - Electricity

Year 1

Year 2

Year 3

Year 4

- **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

Year 6

- **Understand** (and 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.

Chemistry

Year Group

Year 1

Year 2

Year 3

Year 4

Year 5

Year 6

Materials

✓

✓

States of
Matter

✓

✓

Rocks (and
soils)

✓

Topic Progression

Materials

Year 1

- **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

Year 2

- **Find out** how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching
- **Identify and compare** the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses

Year 3

Year 4

Year 5

Year 6

Topic Progression

States of Matter

Year 1

Year 2

Year 3

Year 4

- **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

- **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.

Year 6

Topic Progression

Rocks and Soil

Year 1

Year 2

Year 3

- **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

Year 5

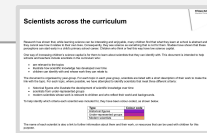
Year 6

Science in Context: Real Science

Aims

This strand is designed to ensure children not only enjoy science but they see its **relevance to their lives today**. At Hampton Vale we want our Science curriculum to **spark a life-long love of Science**. The aim of this strand is to expose children to the contributions of real scientists to our world and **inspire** them into future **careers as scientists**.

Scientists across the curriculum (historical, underrepresented, modern)



Historical	Modern	Underrepresented	Gender
Historical A list of historical scientists and their contributions.	Modern A list of modern scientists and their contributions.	Underrepresented A list of scientists from underrepresented groups and their contributions.	Gender A list of scientists and their contributions, categorized by gender.

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Scientists and their careers



Name	Photo	Career
Marie Curie		Physicist and Chemist
Isaac Newton		Physicist and Mathematician
Albert Einstein		Physicist
Stephen Hawking		Physicist and Cosmologist

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A scientist just like me

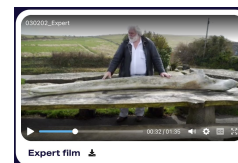
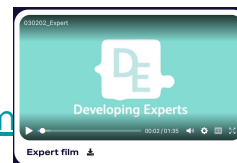
A SCIENTIST JUST LIKE ME

Introducing children to a diverse range of scientists and people who work in science-related jobs



<https://pstt.org.uk/resources/curriculum-materials/ASJLM>

Developing Experts



<https://developingexperts.com/s/unit-library/curriculum>

Thinking and Working Scientifically (Scientific Enquiry)

Year 1 & 2	Year 3 & 4	Year 5 & 6
<p>Sc1/1.1 asking simple questions and recognising that they can be answered in different ways</p> <p>Sc1/1.2 observing closely, using simple equipment</p> <p>Sc1/1.3 performing simple tests</p> <p>Sc1/1.4 identifying and classifying</p> <p>Sc1/1.5 using their observations and ideas to suggest answers to questions</p> <p>Sc1/1.6 gathering and recording data to help in answering questions.</p>	<p>Sc4/1.1 asking relevant questions and using different types of scientific enquiries to answer them</p> <p>Sc4/1.2 setting up simple practical enquiries, comparative and fair tests</p> <p>Sc4/1.3 making systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers</p> <p>Sc4/1.4 gathering, recording, classifying and presenting data in a variety of ways to help in answering questions</p> <p>Sc4/1.5 recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables</p> <p>Sc4/1.6 reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions</p> <p>Sc4/1.7 using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions</p> <p>Sc4/1.8 identifying differences, similarities or changes related to simple scientific ideas and processes</p> <p>Sc4/1.9 using straightforward scientific evidence to answer questions or to support their findings.</p>	<p>Sc5/1.1 planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary</p> <p>Sc5/1.2 taking measurements, using a range of scientific equipment, with increasing accuracy and precision</p> <p>Sc5/1.3 recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, and bar and line graphs</p> <p>Sc5/1.4 using test results to make predictions to set up further comparative and fair tests</p> <p>Sc5/1.5 reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of results, in oral and written forms such as displays and other presentations</p> <p>Sc5/1.6 identifying scientific evidence that has been used to support or refute ideas or arguments.</p>

Thinking and Working Scientifically (Scientific Enquiry)

Our Scientific Enquiry strand is broken up into two parts - Approaches and Skills as detailed below. Approaches refers to what they will be **doing**. Skills refers to what they will be practicing whilst undertaking that particular approach.

ENQUIRY APPROACHES

Comparative / fair testing

Changing one variable to see its effect on another, whilst keeping all others the same.



Research

Using secondary sources of information to answer scientific questions.



Observation over time

Observing changes that occur over a period of time ranging from minutes to months.



Pattern-seeking

Identifying patterns and looking for relationships in enquiries where variables are difficult to control.



Identifying, grouping and classifying

Making observations to name, sort and organise items.



Problem-solving

Applying prior scientific knowledge to find answers to problems.



ENQUIRY SKILLS

Asking questions

Asking questions that can be answered using a scientific enquiry.



Making predictions

Using prior knowledge to suggest what will happen in an enquiry.



Setting up tests

Deciding on the method and equipment to use to carry out an enquiry.



Observing and measuring

Using senses and measuring equipment to make observations about the enquiry.



Recording data

Using tables, drawings and other means to note observations and measurements.



Interpreting and communicating results

Using information from the data to say what you found out.



Evaluating

Reflecting on the success of the enquiry approach and identifying further questions for enquiry.



Comparative / fair testing

Changing one variable to see its effect on another, whilst keeping all others the same.



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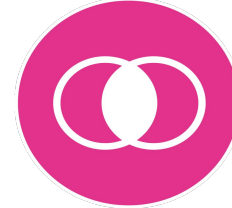


Problem-solving

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Enquiry Approaches



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Asking questions that can be answered using a scientific enquiry.



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Evaluating





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Enquiry Skills



Scientific Enquiry

Enquiry Approaches Comparative/Fair Testing, Research, Observations over time, Pattern-Seeking, Identifying, grouping and classifying, Problem-solving		Enquiry Skills Asking questions, Making predictions, Setting up tasks, Observing and measuring, Recording data, Interpreting and communicating results, Evaluating	
Comparative/Fair Testing	 	Asking questions	 
Research		Making predictions	
Observations over time	 	Setting up tasks	 
Pattern-Seeking		Observing and measuring	
Identifying, grouping and classifying	 	Recording data	 
Problem-solving		Interpreting and communicating results	
		Evaluating	