Science Year 4 Curriculum Overview

The Big Picture
In this unit, pupils will identify how the habitat changes throughout the year and will explore possible ways of grouping a wide selection of living things that include animals, flowering plants and non-flowering plants. Pupils put vertebrate animals into groups, for example: fish, amphibians, reptiles, birds, and mammals; and invertebrates into snails and slugs, worms, spiders, and insects. Pupils will explore examples of human impact (both positive and negative) on environments, for example, the positive effects of nature reserves, ecologically planned parks, or garden ponds, and the negative effects of population and development, litter or deforestation.

What do we already know?
Knowledge Retrieval:
Children will build on their knowledge of living things and their environments from Year 2. Children can explore and compare the differences between things that are living, dead, and things that have never been alive and identify that most living things live in habitats suited to them. They can identify and name a variety of plants and animals in their habitats, including microhabitats and describe how animals obtain their food from plants and other animals, using the idea of a simple food chain.

Year 4 Science – All Living Things

NC objectives – Year 4
Knowledge:
- To recognise that living things can be grouped in a variety of ways
- To explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment
- To recognise that environments can change and that this can sometimes pose dangers to living things

Working scientifically:
- To ask relevant questions and using different types of scientific enquiries to answer them
- To set up simple practical enquiries, comparative and fair tests
- To make systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers
- To gather, record, classify and present data in a variety of ways to help in answering questions
- To record findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables
- To report on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions
- To use results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions
- To identify differences, similarities or changes related to simple scientific ideas and processes
- To use straightforward scientific evidence to answer questions or to support their findings.

Sticky Knowledge:
- Can they use a classification key to group a variety of living things? (plants, vertebrates, invertebrates)
- Can they compare the classification of common plants and animals to living things found in other places? (under the sea, prehistoric)
- Can they name and group a variety of living things based on feeding patterns? (producer, consumer, predator, prey, herbivore, carnivore, omnivore)
- Do they recognise that environments can change and this can sometimes pose a danger to living things?
- **Challenge** - Can they give reasons for how they have classified animals and plants, using their characteristics and how they are suited to their environment?

Working scientifically:
Planning:
- Can they set up a simple fair test to make comparisons?
- Can they plan a fair test and isolate variables and explain why it was fair and explain which variables have been isolated?
- Can they suggest improvements and predictions?
- Can they decide which information needs to be collected and decide which is the best way for collecting it?
- Can they use their findings to draw a simple conclusion?
- **Challenge -** Can they plan and carry out an investigation by controlling variables fairly and accurately?
- **Challenge -** Can they use test results to make further predictions and set up further comparative tests?

Obtaining and presenting evidence:
- Can they take measurements using different equipment and units of measure and record what they have found in a range of ways?
- Can they make accurate measurements using standard units?
- Can they explain their findings in different ways (display, presentation, writing)?
- **Challenge** - Can they record more complex data and results using scientific diagrams, classification keys, tables, bar charts, line graphs and models?

Considering evidence and evaluating:
- Can they find any patterns in their evidence or measurements?
- Can they make a prediction based on something they have found out?
- Can they record and present what they have found using scientific language, drawings, labelled diagrams, bar charts and tables?
- **Challenge** - Can they report findings from investigations through written explanations and conclusions?
- **Challenge** -Can they use a graph or diagram to answer scientific questions?

Key unit objectives
Knowledge
- To recognise that living things can be grouped in a variety of ways.
- To explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment.
- To recognise that environments can change and this can sometimes pose dangers to living things.

Types of scientific enquiry covered
- Identifying and classifying
- fair testing
- pattern seeking
- research

Key vocabulary and understanding for concept connectors
Classification, habitat, Environment, hibernate, flowering, nonflowering, invertebrate,

Research/scientists/careers:
Jacques Cousteau (Oceanographer and coinventor of the aqualung)

Science Year 4 Curriculum Overview

The Big Picture

This unit will provide pupils with a knowledge of electricity. They will be able to construct a simple series circuit, trying different components. They will explore using bulbs, buzzers, motors and switches. They will use their circuits to create simple devices.

What do we already know?

Knowledge Retrieval:

Pupils will build on their basic knowledge of electricity from History lessons. The children have a basic awareness of what electricity is and that there was no electricity in the past. The children are able to explain why a particular mode of transport is from a particular time period. I.e. a steam train is older because it does not run on electricity.

Year 4 Science – Electricity

NC objectives – Year 4

Knowledge:

- To identify common appliances that run on electricity
- To construct a simple series electrical circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers
- To 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
- To recognise that a switch opens and closes a circuit and associate this with whether or not a lamp lights in a simple series circuit
- To recognise some common conductors and insulators, and associate metals with being good conductors

Working scientifically:

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

Sticky knowledge:

- Can they explain how electricity is useful to us?
- Can they construct a simple circuit?
- Can they explain what a conductor is and test materials for conductivity?
- Can they explain closed and open circuits?
- Can they construct a circuit with a switch?
- Can they recognise some common conductors and insulators?
- **Challenge** – Can they explain how a bulb might get dimmer?
- **Challenge** – Can they work out which metals can be used to connect across a gap in a circuit?
- **Challenge** - Can they recognise if all metals are conductors of electricity?

Working scientifically:

Planning:

- Can they set up a simple fair test to make comparisons?
- Can they plan a fair test and isolate variables and explain why it was fair and explain which variables have been isolated?
- Can they suggest improvements and predictions?
- Can they decide which information needs to be collected and decide which is the best way for collecting it?
- Can they use their findings to draw a simple conclusion?
- **Challenge** - Can they plan and carry out an investigation by controlling variables fairly and accurately?
- **Challenge** - Can they use test results to make further predictions and set up further comparative tests?

Obtaining and presenting evidence:

- Can they take measurements using different equipment and units of measure and record what they have found in a range of ways?
- Can they make accurate measurements using standard units?
- Can they explain their findings in different ways (display, presentation, writing)?
- **Challenge** - Can they record more complex data and results using scientific diagrams, classification keys, tables, bar charts, line graphs and models?

Considering evidence and evaluating:

- Can they find any patterns in their evidence or measurements?
- Can they make a prediction based on something they have found out?
- Can they record and present what they have found using scientific language, drawings, labelled diagrams, bar charts and tables?
- **Challenge** - Can they report findings from investigations through written explanations and conclusions?
- **Challenge** -Can they use a graph or diagram to answer scientific questions?

Key unit objectives

- To identify common appliances that run on electricity
- To be able to construct a simple series electrical circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers.
- To 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.
- To recognise that a switch opens and closes a circuit and associate this with whether or not a lamp lights in a simple series circuit
- To recognise some common conductors
- To recognise some common insulators
- To know that metals are good conductors.

Types of scientific enquiry covered

- Identifying and classifying
- Research
- Comparison tests
- Fair tests

Key vocabulary and understanding for concept connectors

electric current,
crocodile clips,
wires,
bulb,
cell,
battery holder,
motor,
buzzer,
switch,
conductor,
electrical insulator,
component.

Research/scientists/careers:

Thomas Edison (Inventor of the lightbulb and power grid)

Lewis Howard Latimer (Electronic Engineer who improved the design of Edison's light bulb and brought street lighting to the world)

Science Year 4 Curriculum Overview

The Big Picture

This unit will provide pupils with a more in-depth knowledge of animals and humans. The children will be introduced to the main body parts associated with the digestive system. They will learn the names and they will explore questions that help them to understand their special functions.

What do we already know?

Knowledge Retrieval:

Pupils will build on their knowledge of animals and humans from year 2. They are aware that animals need food, water, shelter and space to survive and they will have a basic knowledge of the food groups are: carbohydrates, proteins, fruit and vegetables, dairy, oils and spreads. Pupils will also build on their knowledge from year 3. They will be able to identify that animals and humans need the right amount of nutrition, and that they cannot make their own food. They are also aware that some animals have skeletons and muscles for support, protection and movement.

Year 4 Science – Animals including humans

NC objectives – Year 4

Knowledge:

- To describe the simple functions of the basic parts of the digestive system in humans
- To identify the different types of teeth in humans and their simple functions.
- To construct and interpret a variety of food chains, identify producers, predators and prey.

Working scientifically:

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

Sticky Knowledge:

- Can they identify and name the basic parts of the human digestive system?
- Can they describe the function of the organs of the human digestive system?
- Can they identify the simple function of different types of human teeth?
- Can they compare the teeth of herbivores and carnivores?
- Can they explain what a simple food chain shows?
- **Challenge** - Can they classify living things and non-living things by a number of characteristics that they have thought of?
- **Challenge** Can they explain how people, weather and the environment can affect living things?
- **Challenge** Can they explain how certain living things depend on one another to survive?

Working scientifically:

Planning:

- Can they set up a simple fair test to make comparisons?
- Can they plan a fair test and isolate variables and explain why it was fair and explain which variables have been isolated?
- Can they suggest improvements and predictions?
- Can they decide which information needs to be collected and decide which is the best way for collecting it?
- Can they use their findings to draw a simple conclusion?
- **Challenge -** Can they plan and carry out an investigation by controlling variables fairly and accurately?
- **Challenge -** Can they use test results to make further predictions and set up further comparative tests?

Obtaining and presenting evidence:

- Can they take measurements using different equipment and units of measure and record what they have found in a range of ways?
- Can they make accurate measurements using standard units?
- Can they explain their findings in different ways (display, presentation, writing)?
- **Challenge** - Can they record more complex data and results using scientific diagrams, classification keys, tables, bar charts, line graphs and models?

Considering evidence and evaluating:

- Can they find any patterns in their evidence or measurements?
- Can they make a prediction based on something they have found out?
- Can they record and present what they have found using scientific language, drawings, labelled diagrams, bar charts and tables?
- **Challenge** - Can they report findings from investigations through written explanations and conclusions?
- **Challenge** -Can they use a graph or diagram to answer scientific questions?

Key unit objectives

Knowledge

- To know the basic parts of the digestive system.
- To describe the simple functions of the basic parts of the digestive system in humans.
- To construct and interpret a variety of food chains identifying producers, predators and prey.
- To know the 4 different types of teeth.
- To know the functions for the different types of teeth.

Types of scientific enquiry covered

- Identifying and classifying
- pattern seeking
- research

Key vocabulary and understanding for concept connectors

Incisors help you bite and chew, **Canines** are for tearing and ripping, **Molars** help you crush and grind food.

Digestive system: mouth, pancreas, oesophagus, liver, duodenum, anus, salivary glands, tongue.

Producer, consumer

Research/scientists/careers:

William Beaumont (Surgeon who first observed and studied human digestion as it occurs in the stomach)
Washington & Lucius Sheffield (Dentists who invented toothpaste in a tube)

Science Year 4 Curriculum Overview

The Big Picture

This unit will provide pupils with the opportunities to explore a variety of everyday materials and develop simple descriptions of the states of matter. They will learn that solids hold their shape; liquids form a pool not a pile; gases escape from an unsealed container). Pupils will observe water as a solid, a liquid and a gas and will note the changes to water when it is heated or cooled.

What do we already know?

Knowledge Retrieval:

Pupils will build on their knowledge of materials from year 2 where they were introduced to solids and liquids, explored basic solids and liquids and looked at their simple descriptive properties.

Year 4 Science – States of matter

NC objectives – Year 4

Knowledge:

- To compare and group materials together, according to whether they are solids, liquids or gases
- To 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)
- To identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature
- Working scientifically:
- To ask relevant questions and using different types of scientific enquiries to answer them
- To set up simple practical enquiries, comparative and fair tests
- To make systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers
- To gather, record, classify and present data in a variety of ways to help in answering questions
- To record findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables
- To report on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions
- To use results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions
- To identify differences, similarities or changes related to simple scientific ideas and processes
- To use straightforward scientific evidence to answer questions or to support their findings.

Sticky Knowledge:

- Can they compare and group materials based on their states of matter, ie, liquid, solid or gas?
- Can they explain what happens to materials when they are heated or cooled?
- Can they measure the temperature at which different materials change state?
- Can they use measurements to explain changes to the state of water?
- Can they explain the part that evaporation and condensation has in the water cycle?
- **Challenge** - Can they group and classify a variety of materials according to the impact of temperature on them?
- **Challenge** - Can they explain what happens over time to materials such as puddles on the playground or washing hanging on a line?
- **Challenge** - Can they relate temperature to change of state of materials?

Working scientifically:

Planning:

- Can they set up a simple fair test to make comparisons?
- Can they plan a fair test and isolate variables and explain why it was fair and explain which variables have been isolated?
- Can they suggest improvements and predictions?
- Can they decide which information needs to be collected and decide which is the best way for collecting it?
- Can they use their findings to draw a simple conclusion?
- **Challenge -** Can they plan and carry out an investigation by controlling variables fairly and accurately?
- **Challenge -** Can they use test results to make further predictions and set up further comparative tests?

Obtaining and presenting evidence:

- Can they take measurements using different equipment and units of measure and record what they have found in a range of ways?
- Can they make accurate measurements using standard units?
- Can they explain their findings in different ways (display, presentation, writing)?
- **Challenge** - Can they record more complex data and results using scientific diagrams, classification keys, tables, bar charts, line graphs and models?

Considering evidence and evaluating:

- Can they find any patterns in their evidence or measurements?
- Can they make a prediction based on something they have found out?
- Can they record and present what they have found using scientific language, drawings, labelled diagrams, bar charts and tables?
- **Challenge** - Can they report findings from investigations through written explanations and conclusions?
- **Challenge** -Can they use a graph or diagram to answer scientific questions?

Key unit objectives

Knowledge

- To understand the 3 states of matter, solids, liquids and gases.
- To be able to compare and group together solids, liquids and gases.
- To know that materials can change state.
- To understand that a change of state can happen through heating/cooling.
- To know the temperature for evaporation and condensation.
- To identify evaporation and condensation in the water cycle.
- To associate the rate of evaporation with temperature.

Types of scientific enquiry covered

- pattern seeking
- research
- comparison/fair testing

Key vocabulary and understanding for concept connectors

energy, particles, materials, condensation,
Solids have a fixed shape and volume.
Liquids fill the shape of a container and have a fixed volume.
Gases fill the shape and the volume of a container.
Evaporation is when water is heated and turns into gas.

Research/scientists/careers:

Joseph Priestley (Clergyman who discovered oxygen at about the same time as Carl Wilhelm Scheele) Carl Wilhelm Scheele (Chemist who discovered oxygen at about the same time as Joseph Priestley)
Daniel Fahrenheit (Physicist who invented the Fahrenheit temperature scale and the thermometer)
Anders Celsius (Astronomer who invented the degrees Celsius temperature scale)

Science Year 4 Curriculum Overview

The Big Picture

This unit will provide pupils with the opportunity to explore and identify the way sound is made through vibration. They will explore this in a range of different musical instruments, and they will find out how the pitch and volume of sounds can be changed in a variety of ways.

What do we already know?

Knowledge Retrieval:

Pupils will build on their knowledge of sound from music lessons. The children are aware that if you beat a drum harder, it will make a louder noise.

Year 4 Science – Sound

NC objectives – Year 4

Knowledge:

- To identify how sounds are made, associating some of them with something vibrating
- To recognise that vibrations from sounds travel through a medium to the ear
- To find patterns between the pitch of a sound and features of the object that produced it
- To find patterns between the volume of a sound and the strength of the vibrations that produced it
- To recognise that sounds get fainter as the distance from the sound source increases

- Working scientifically:
- To ask relevant questions and using different types of scientific enquiries to answer them
- To set up simple practical enquiries, comparative and fair tests
- To make systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers
- To gather, record, classify and present data in a variety of ways to help in answering questions
- To record findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables
- To report on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions
- To use results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions
- To identify differences, similarities or changes related to simple scientific ideas and processes
- To use straightforward scientific evidence to answer questions or to support their findings.

Sticky Knowledge:

- Can they describe a range of sounds and explain how they are made?
- Can they compare sources of sound and explain how the sounds differ?
- Can they explain how to change a sound (louder/softer)?
- Can they describe and explain how a sound travels from a source to our ears?
- Can they explain what happens to sound as it travels away from its source?
- Can they explain how you could change the pitch of a sound?
- Can they investigate how different materials can affect the pitch and volume of sounds?
- **Challenge** - Can they explain why sound gets fainter or louder according to the distance?
- **Challenge** - Can they explain how pitch and volume can be changed in a variety of ways?
- **Challenge** - Can they work out which materials give the best insulation for sound?

Working scientifically:

Planning:

- Can they set up a simple fair test to make comparisons?
- Can they plan a fair test and isolate variables and explain why it was fair and explain which variables have been isolated?
- Can they suggest improvements and predictions?
- Can they decide which information needs to be collected and decide which is the best way for collecting it?
- Can they use their findings to draw a simple conclusion?
- **Challenge -** Can they plan and carry out an investigation by controlling variables fairly and accurately?
- **Challenge -** Can they use test results to make further predictions and set up further comparative tests?

Obtaining and presenting evidence:

- Can they take measurements using different equipment and units of measure and record what they have found in a range of ways?
- Can they make accurate measurements using standard units?
- Can they explain their findings in different ways (display, presentation, writing)?
- **Challenge** - Can they record more complex data and results using scientific diagrams, classification keys, tables, bar charts, line graphs and models?

Considering evidence and evaluating:

- Can they find any patterns in their evidence or measurements?
- Can they make a prediction based on something they have found out?
- Can they record and present what they have found using scientific language, drawings, labelled diagrams, bar charts and tables?
- **Challenge** - Can they report findings from investigations through written explanations and conclusions?
- **Challenge** -Can they use a graph or diagram to answer scientific questions?

Key unit objectives

Knowledge

- To find patterns between the pitch of a sound and features of the object that produced it.
- To find patterns between the volume of a sound and the strength of the vibrations that produced it.
- To know that sounds are made through vibrations.
- To know that vibrations from sounds travel through a medium to the ear.
- To know that sounds get fainter with distance.

Types of scientific enquiry covered

- pattern seeking
- research
- comparison/fair testing

Key vocabulary and understanding for concept connectors

Amplitude, volume, pitch, instruments, wave, strength, vibrations

Sound is produced when an object vibrates.

Research/scientists/careers:

Aristotle (Philosopher who developed the concept that sound travels through air due to the movement of air particles)

Isaac Newton - search document for information (Mathematician & Physicist who measured the speed of sound)

Science Year 4 Curriculum Overview

The Big Picture

Children will have built up an understanding of science over the year. This time allows the teacher to identify and fill any gaps that may still be present. The 'super scientists' topic allows the children time to use their creative side and come up with their own scientific enquiry based questions and allows them the time to plan and investigate these ideas. The whole topic is child centred and allows the children to have fun whilst learning the fundamental skills working scientifically.

Working scientifically:

Planning:

- Can they set up a simple fair test to make comparisons?
- Can they plan a fair test and isolate variables and explain why it was fair and explain which variables have been isolated?
- Can they suggest improvements and predictions?
- Can they decide which information needs to be collected and decide which is the best way for collecting it?
- Can they use their findings to draw a simple conclusion?
- **Challenge -** Can they plan and carry out an investigation by controlling variables fairly and accurately?
- **Challenge -** Can they use test results to make further predictions and set up further comparative tests?

Obtaining and presenting evidence:

- Can they take measurements using different equipment and units of measure and record what they have found in a range of ways?
- Can they make accurate measurements using standard units?
- Can they explain their findings in different ways (display, presentation, writing)?
- **Challenge** - Can they record more complex data and results using scientific diagrams, classification keys, tables, bar charts, line graphs and models?

Considering evidence and evaluating:

- Can they find any patterns in their evidence or measurements?
- Can they make a prediction based on something they have found out?
- Can they record and present what they have found using scientific language, drawings, labelled diagrams, bar charts and tables?
- **Challenge** - Can they report findings from investigations through written explanations and conclusions?
- **Challenge** -Can they use a graph or diagram to answer scientific questions?

Year 4 Science – Super scientists

NC objectives – Year 4

- Working scientifically:
- To ask relevant questions and using different types of scientific enquiries to answer them
- To set up simple practical enquiries, comparative and fair tests
- To make systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers
- To gather, record, classify and present data in a variety of ways to help in answering questions
- To record findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables
- To report on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions
- To use results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions
- To identify differences, similarities or changes related to simple scientific ideas and processes
- To use straightforward scientific evidence to answer questions or to support their findings.

Types of scientific enquiry covered

- Identifying and classifying
- Pattern seeking
- Comparative tests
- Observations over time
- research

Key vocabulary and understanding for concept connectors

Prediction – Where you say what you think will happen.
Change, measure
Equipment – What we use.
Conclusion
Research

Research/scientists/careers:

Linked to children's interests and ideas.