



The **BIG** Picture

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.

Additional experiences to enhance learning: STEM visitors and experiences, links with the local High School, can visit the pond at a local Primary School and use the school grounds

NC Objectives: Working Scientifically taught throughout Year 3/4:

- 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.

Key vocabulary:

Classification, classification keys, environment, habitat, human impact, positive, negative, migrate, hibernate

What do we already know?

- Identify and name a variety of common wild and garden plants, including deciduous and evergreen trees. (Y1 - Plants)
- Identify and describe the basic structure of a variety of common flowering plants, including trees. (Y1 - Plants)
- Identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals. (Y1 - Animals including humans)
- Describe and compare the structure of a variety of common animals (fish, amphibians, reptiles, birds and mammals, including pets). (Y1 - Animals, including humans)
- Identify and name a variety of plants and animals in their habitats, including microhabitats. (Y2 - Living things and their habitats)

National Curriculum Knowledge: Year 6:

- 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

Types of Scientific Enquiry:

- Identifying and classifying
- Fair testing
- Pattern seeking
- Research

Key Knowledge:

Living things can be grouped (classified) in different ways according to their features. Classification keys can be used to identify and name living things.

Living things live in a habitat which provides an environment to which they are suited (Year 2 learning). These environments may change naturally e.g. through flooding, fire, earthquakes etc. Humans also cause the environment to change. This can be in a good way (i.e. positive human impact, such as setting up nature reserves) or in a bad way (i.e. negative human impact, such as littering). These environments also change with the seasons; different living things can be found in a habitat at different times of the year.

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?

Scientists across the Curriculum:

Choose from the following options:

Jacques Cousteau - Oceanographer and co-inventor of the aqualung

Rachel Carson - Aquatic Biologist who wrote about environmental pollution

Wangari Maathai - Biologist and Environmental Activist

Kelsey Archer Barnhill - Deep Sea Ecologist

Liz Bonnin - TV presenter and Wildlife Conservationist



The BIG Picture

Pupils will gain a more in-depth knowledge of animals and humans. They will be introduced to the main body parts associated with the digestive system, the names and explore questions that help them to understand their special functions. They will learn about different types of teeth and their function and learn to construct and interpret food chains.

Additional experiences to enhance learning: STEM visitors and experiences, support from Halton Health Improvement Team, links with the local High School, can visit the pond at a local Primary School and use the school grounds

**NC Objectives:
Working Scientifically taught throughout Year 3/4:**

- Asking relevant questions and using different types of scientific enquiries to answer them
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- 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.

Key vocabulary:

Digestive system, digestion, mouth, teeth, saliva, oesophagus, stomach, small intestine, nutrients, large intestine, rectum, anus, teeth, incisor, canine, molar, premolars, herbivore, carnivore, omnivore, producer, predator, prey, food chain

What do we already know?

- Identify and name a variety of common animals that are carnivores, herbivores and omnivores. (Y1 - Animals, including humans)
- Find out about and describe the basic needs of animals, including humans, for survival (water, food and air). (Y2 - Animals, including humans)
- Describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene. (Y2 - 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. (Y3 - Animals, including humans)

National Curriculum Knowledge: Year 4:

- 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.

- Types of Scientific Enquiry:

- Identifying and classifying
- Pattern seeking
- Research

Key Knowledge:

Food enters the body through the mouth. Digestion starts when the teeth start to break the food down. Saliva is added and the tongue rolls the food into a ball. The food is swallowed and passes down the oesophagus to the stomach. Here the food is broken down further by being churned around and other chemicals are added. The food passes into the small intestine. Here nutrients are removed from the food and leave the digestive system to be used elsewhere in the body. The rest of the food then passes into the large intestine. Here the water is removed for use elsewhere in the body. What is left is then stored in the rectum until it leaves the body through the anus when you go to the toilet. Humans have four types of teeth: incisors for cutting; canines for tearing; and molars and premolars for grinding (chewing). Living things can be classified as producers, predators and prey according to their place in the food chain.

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?

Scientists across the Curriculum:

Choose from the following options:

William Beaumont - Surgeon who first studies human digestion

Washington and Lucius Sheffield - Dentists who invented toothpaste in a tube

Paul Sharpe - Bioengineer who studies how to regrow teeth



The **BIG** Picture

Pupils will be given 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.

Additional experiences to enhance learning: STEM visitors and experiences, links with the local High School and use the school grounds

NC Objectives: Working Scientifically taught throughout Year 3/4:

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Key vocabulary:

solid, liquid, gas, heating, cooling, state change, melting, freezing, melting point, boiling, boiling point, evaporation, condensation, temperature, water cycle

What do we already know?

- Distinguish between an object and the material from which it is made. (Y1 - Everyday materials)
- Identify and name a variety of everyday materials, including wood, plastic, glass, metal, water, and rock. (Y1 - Everyday materials)
- Describe the simple physical properties of a variety of everyday materials. (Y1 - Everyday materials)
- Compare and group together a variety of everyday materials on the basis of their simple physical properties. (Y1 - 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. (Y2 - Uses of everyday materials)
- Find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching. (Y2 - Uses of everyday materials)

National Curriculum Knowledge: 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

- Types of Scientific Enquiry:

- Pattern seeking
- Research
- Comparison / fair testing

Key Knowledge:

A solid keeps its shape and has a fixed volume. A liquid has a fixed volume but changes in shape to fit the container. A liquid can be poured and keeps a level, horizontal surface. A gas fills all available space; it has no fixed shape or volume. Granular and powdery solids like sand can be confused with liquids because they can be poured, but when poured they form a heap and they do not keep a level surface when tipped. Each individual grain demonstrates the properties of a solid. Melting is a state change from solid to liquid. Freezing is a state change from liquid to solid. The freezing point of water is 0°C. Boiling is a change of state from liquid to gas that happens when a liquid is heated to a specific temperature and bubbles of the gas can be seen in the liquid. Water boils when it is heated to 100°C. Evaporation is the same state change as boiling (liquid to gas), but it happens slowly at lower temperatures and only at the surface of the liquid. Evaporation happens more quickly if the temperature is higher, the liquid is spread out or it is windy. Condensation is the change back from a gas to a liquid caused by cooling. Water at the surface of seas, rivers, etc. evaporates into water vapour (a gas). This rises, cools and condenses back into a liquid forming clouds. When too much water has condensed, the water droplets in the cloud get too heavy and fall back down as rain, snow, sleet etc. and drain back into rivers etc. This is known as precipitation. This is the water cycle.

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?

Scientists across the Curriculum:

Choose from the following options:

Joseph Priestley - Clergyman who discovered oxygen

Carl Wilhelm Scheele - Chemist who discovered oxygen at the same time as Joseph Priestley

Daniel Fahrenheit - Physicist who invented Fahrenheit temperature

Anders Celcius - Astronomer who invented degrees Celsius

John Boyd Dunlop - Inventor of the pneumatic tyre



The BIG Picture

Pupils will be given 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.

Additional experiences to enhance learning: STEM visitors and experiences, links with the local High School, and use the school grounds

What do we already know?

- Explore how things work. (Nursery - Sound)
- Describe what they see, hear and feel whilst outside. (Reception - Sound)
- Identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense. (Y1 - Animals, including humans)

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?

**NC Objectives:
Working Scientifically taught throughout Year 3/4:**

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National Curriculum Knowledge: 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.
- **Types of Scientific Enquiry:**
 - Pattern seeking
 - Research
 - Comparison / fair testing

Key Knowledge:

A sound produces vibrations which travel through a medium from the source to our ears. Different mediums such as solids, liquids and gases can carry sound, but sound cannot travel through a vacuum (an area empty of matter). The vibrations cause parts of our body inside our ears to vibrate, allowing us to hear (sense) the sound.

The loudness (volume) of the sound depends on the strength (size) of vibrations which decreases as they travel through the medium. Therefore, sounds decrease in volume as you move away from the source. A sound insulator is a material which blocks sound effectively.

Pitch is the highness or lowness of a sound and is affected by features of objects producing the sounds. For example, smaller objects usually produce higher pitched sounds.

Key vocabulary:

Sound, source, vibrate, vibration, travel, pitch (high, low), volume, faint, loud, insulation

Scientists across the Curriculum:

Choose from the following options:

Aristotle – Philosopher who developed the concept that sound travels through air

Isaac Newton – Mathematician and Physicist who measured the speed of sounds



The **BIG** Picture

Pupils will begin to develop 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.

Additional experiences to enhance learning: STEM visitors and experiences and links with the local High School

What do we already know?

Explore how things work. (Nursery - Electricity)

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?

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Key vocabulary:

Electricity, electrical appliance/device, mains, plug, electrical circuit, complete circuit, component, cell, battery, positive, negative, connect/connections, loose connection, short circuit, crocodile clip, bulb, switch, buzzer, motor, conductor, insulator, metal, non-metal, symbol
N.B.
Children in Year 4 do not need to use standard symbols for electrical components, as this is taught in Year 6

National Curriculum Knowledge: 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.

Types of Scientific Enquiry:

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

Key Knowledge:

Many household devices and appliances run on electricity. Some plug in to the mains and others run on batteries. An electrical circuit consists of a cell or battery connected to a component using wires. If there is a break in the circuit, a loose connection or a short circuit, the component will not work. A switch can be added to the circuit to turn the component on and off.
Metals are good conductors so they can be used as wires in a circuit.
Non-metallic solids are insulators except for graphite (pencil lead).
Water, if not completely pure, also conducts electricity.

Scientists across the Curriculum:

Choose from the following options:
Thomas Edison - Inventor of the lightbulb and power grid
Joseph Swan - Physicist and Chemist who developed primitive electric light
Lewis Howard Latimer - Electronic Engineer who improved the design of Edison's light bulb
Ronit Kanwar - Businessman who set up affordable, sustainable solar-powered lights for the poor in rural India
William Kamkwamba - Inventor who brought electricity to his village in Malawi
Zubera Iqbal - Chemist who explores sustainable ways to recycle electric vehicle batteries