



The BIG Picture

Pupils will build on their learning about grouping living things in year 4 by looking at the classification system in more detail. They will be introduced to the idea that broad groupings, such as micro-organisms, plants and animals can be subdivided. Through direct observations, they will classify animals into commonly found invertebrates (such as insects, spiders, snails, worms) and vertebrates (fish, amphibians, reptiles, birds and mammals). They will discuss reasons why living things are placed in one group and not another. Pupils will find out about the significance of the work of scientists.

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

NC KS2 Science grounds

Working Scientifically taught throughout Year 5/6:

- 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 a 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

Key vocabulary:

vertebrates, fish, amphibians, reptiles, birds, mammals, invertebrates, warm-blooded, cold-blooded, insects, spiders, snails, worms, flowering, non-flowering, mosses, ferns, conifers

What do we already know?

- Recognise that living things can be grouped in a variety of ways. (Y4 - Living things and their habitats)
- Explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment. (Y4 - Living things and their habitats)
- Describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird. (Y5 - Living things and their habitats)
- Describe the life process of reproduction in some plants and animals. (Y5 - Living things and their habitats)

National Curriculum Knowledge: Year 6:

- Describe how living things are classified into broad groups according to common observable characteristics and based on similarities and differences, including micro-organisms, plants and animals.
- Give reasons for classifying plants and animals based on specific characteristics.

Types of Scientific Enquiry:

- Identifying and classifying
- Fair testing
- Changes over time

Key Knowledge:

Living things can be formally grouped according to characteristics. Plants and animals are two main groups but there are other living things that do not fit into these groups e.g. micro-organisms such as bacteria and yeast, and toadstools and mushrooms. Plants can make their own food whereas animals cannot.

Animals can be divided into two main groups: those that have backbones (vertebrates); and those that do not (invertebrates). Vertebrates can be divided into five small groups: fish; amphibians; reptiles; birds; and mammals. Each group has common characteristics. Invertebrates can be divided into a number of groups, including insects, spiders, snails and worms.

Plants can be divided broadly into two main groups: flowering plants; and non-flowering plants.

Sticky Knowledge:

- Can they explain the classification of living things into broad groups based on common observable characteristics? (five kingdoms of all living things, vertebrates, mammals, marsupials)
- Can they sub divide their original groupings and explain their divisions?
- Can they group animals into vertebrates and invertebrates?
- **Challenging** - Can they explain why classification is important?
- **Challenging** - Can they readily group animals into reptiles, fish, amphibians, birds and mammals?

Scientists across the Curriculum:

Choose from the following options:

- Carl Linnaeus: Botanist and Zoologist
- Agnes Arber: Botanist and first woman to become a fellow of Royal Society
- Hu Xiansu: Botanist and founder of plant taxonomy in China
- Beatrix Potter: Mycologist and Scientific Illustrator



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

NC Objectives:
Working Scientifically taught throughout Year 5/6:

- 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
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- Identifying scientific evidence that has been used to support or refute ideas or arguments

Key vocabulary:

Heart, pulse, rate, pumps, blood, blood vessels, transported, lungs, oxygen, carbon dioxide, nutrients, water, muscles, cycle, circulatory system, diet, exercise, drugs, lifestyle

What do we already know?

- 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)
- Describe the simple functions of the basic parts of the digestive system in humans. (Y4 - Animals, including humans)
- Identify the different types of teeth in humans and their simple functions.
- (Y4 - Animals, including humans)

Sticky Knowledge:

Can they explain the classification of living things into broad groups based on common observable characteristics? (five kingdoms of all living things, vertebrates, mammals, marsupials)

Can they sub divide their original groupings and explain their divisions? Can they group animals into vertebrates and invertebrates?

Challenging - Can they explain why classification is important?

Challenging - Can they readily group animals into reptiles, fish, amphibians, birds and mammals?

National Curriculum Knowledge: Year 6:

- 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.

Types of Scientific Enquiry:

- Identifying and classifying
- Fair testing
- Changes over time

Key Knowledge:

The heart pumps blood in the blood vessels around to the lungs. Oxygen goes into the blood and carbon dioxide is removed. The blood goes back to the heart and is then pumped around the body. Nutrients, water and oxygen are transported in the blood to the muscles and other parts of the body where they are needed. As they are used, they produce carbon dioxide and other waste products. Carbon dioxide is carried by the blood back to the heart and then the cycle starts again as it is transported back to the lungs to be removed from the body. This is the human circulatory system. Diet, exercise, drugs and lifestyle have an impact on the way our bodies function. They can affect how well our heart and lungs work, how likely we are to suffer from conditions such as diabetes, how clearly we think, and generally how fit and well we feel. Some conditions are caused by deficiencies in our diet e.g. lack of vitamins. This content is also included in PSHE: [statutory guidance on Physical health and mental wellbeing \(primary and secondary\)](#).

Scientists across the Curriculum:

Choose from the following options:

William Harvey - Doctor who discover nature of blood circulation and the function of the heart

Santorio Santoria - Doctor who invented instrument to measure pulse

Richard Doll - doctor who proved link between lung cancer and smoking

Ruth Ella Moore - Bacteriologist

James Miranda Steuart Barry - doctor who improved medical care



The BIG Picture

Pupils will explore how living things on earth have changed over time. They will be introduced to the idea that characteristics are passed from parents to their offspring, for instance by considering different breeds of dogs, and what happens when, for example, labradors are crossed with poodles. They will also appreciate that variation in offspring over time can make animals more or less able to survive in particular environments, for example, by exploring how giraffes' necks got longer, or the development of insulating fur on the arctic fox. Pupils will find out about how Charles Darwin and Alfred Wallace developed their ideas on evolution.

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:
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Key vocabulary:

offspring, sexual reproduction, vary, characteristics, suited, adapted, environment, inherited, species, fossils, evolve, evolution

What do we already know?

- 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. (Y2 - Living things and their habitats)
- Notice that animals, including humans, have offspring which grow into adults. (Y2 - Animals, including humans)
- Explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal. (Y3 - Plants)
- Describe in simple terms how fossils are formed when things that have lived are trapped within rock. (Y3 - Rocks)
- Recognise that environments can change and that this can sometimes pose dangers to living things. (Y4 - Living things and their habitats)
- Describe the life process of reproduction in some plants and animals. (Living things and their habitats - Y5)

Sticky Knowledge:

- Can they give reasons for why living things produce offspring of the same kind?
- Can they give reasons for why offspring are not identical with each other or with their parents?
- Can they explain the process of evolution and describe the evidence for this?
- Can they begin to appreciate that variation in offspring over time can make animals more or less able to survive in particular environments?
- Can they talk about the life of Charles Darwin?

Challenging - Can they explain how some living things adapt to survive in extreme conditions?

Challenging - Can they analyse the advantages and disadvantages of specific adaptations, such as being on two rather than four feet?

Challenging - Can they begin to understand what is meant by DNA?

National Curriculum Knowledge: 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

Types of Scientific Enquiry:

- Research
- Changes overtime

Key Knowledge:

All living things have offspring of the same kind, as features in the offspring are inherited from the parents. Due to sexual reproduction, the offspring are not identical to their parents and vary from each other. Plants and animals have characteristics that make them suited (adapted) to their environment. If the environment changes rapidly, some variations of a species may not suit the new environment and will die. If the environment changes slowly, animals and plants with variations that are best suited survive in greater numbers to reproduce and pass their characteristics on to their young. Over time, these inherited characteristics become more dominant within the population. Over a very long period of time, these characteristics may be so different to how they were originally that a new species is created. This is evolution. Fossils give us evidence of what lived on the Earth millions of year ago and provide evidence to support the theory of evolution. More recently, scientists such as Darwin and Wallace observed how living things adapt to different environments to become distinct varieties with their own characteristics.

Scientists across the Curriculum:

Mary Anning - fossil hunter

Charles Darwin - Natural Historian who developed the theory of evolution by natural selection

Alfred Wallace - Natural Historian who developed the theory of evolution by natural selection

Nettie Stevens - Geneticist who concluded that sex is inherited



The BIG Picture

Pupils will explore and should build on the work on light in year 3, exploring the way that light behaves, including light sources, reflection and shadows. They should talk about what happens and make predictions.

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 5/6:

- 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
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Key vocabulary:

light, light source, Sun, sunlight, dangerous, straight lines, light rays

What do we already know?

- Recognise that they need light in order to see things and that dark is the absence of light. (Y3 - Light)
- Notice that light is reflected from surfaces. (Y3 - Light)
- Recognise that light from the sun can be dangerous and that there are ways to protect their eyes. (Y3 - Light)
- Recognise that shadows are formed when the light from a light source is blocked by an opaque object. (Y3 - Light)
- Find patterns in the way that the size of shadows change. (Y3 - Light)
- 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. (Y5 - Properties and changes of materials)

National Curriculum Knowledge: 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

Types of Scientific Enquiry:

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

Key Knowledge:

Light appears to travel in straight lines, and we see objects when light from them goes into our eyes. The light may come directly from light sources, but for other objects some light must be reflected from the object into our eyes for the object to be seen.

Objects that block light (are not fully transparent) will cause shadows. As light travels in straight lines the shape of the shadow will be the same as the outline shape of the object.

Sticky Knowledge:

Can they explain how light travels?

Can they explain how the human eye sees objects?

Can they explain how different colours of light can be created?

Can they use and explain how simple optical instruments work? (periscope, telescope, binoculars, mirror, magnifying glass, Newton's first reflecting telescope)

Can they explain changes linked to light (and sound)?

Challenging - Can they use the ray model to explain the size of shadows?

Scientists across the Curriculum:

Euclid - Mathematician who predicted that light travels in straight lines

Ibn al-Haytham - Physicist and Mathematician proved light travels in straight lines by carry out the first scientific experiment

Ibn Sahl - Mathematician who observed the paths of rays of light

Colin Webb - Professor of Laser Physics



The BIG Picture

Pupils will be provided with the opportunity to build on their work in year 4 and construct simple series circuits to help them to answer questions about what happens when they try different components. Pupils will have the opportunity to experiment with switches, bulbs, buzzers and motors. They will learn how to represent a simple circuit in a diagram using the recognised symbols.

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 5/6:

- Planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary
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Key vocabulary:

Circuit, complete circuit, circuit diagram, circuit symbol, cell, battery, bulb, buzzer, motor, switch, voltage

N.B. Children do not need to understand what voltage is but will use volts and voltage to describe different batteries. The words “cells” and “batteries” are now used interchangeably.

What do we already know? What can we already do?

- Identify common appliances that run on electricity. (Y4 - Electricity)
- Construct a simple series electrical circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers. (Y4 - Electricity)
- 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. (Y4 - Electricity)
- Recognise that a switch opens and closes a circuit and associate this with whether or not a lamp lights in a simple series circuit. (Y4 - Electricity)
- Recognise some common conductors and insulators, and associate metals with being good conductors. (Y4 - Electricity)

National Curriculum Knowledge: Year 6:

- 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.

Types of Scientific Enquiry:

- Research
- Fair tests

Key Knowledge:

Adding more cells to a complete circuit will make a bulb brighter, a motor spin faster or a buzzer make a louder sound. If you use a battery with a higher voltage, the same thing happens. Adding more bulbs to a circuit will make each bulb less bright. When using more motors or buzzers, each motor will spin more slowly and each buzzer will be quieter. Turning a switch off (open) breaks a circuit so the circuit is not complete, and electricity cannot flow. Any bulbs, motors or buzzers will then turn off as well.

You can use recognised circuit symbols to draw simple circuit diagrams.

Sticky Knowledge:

Can they identify and name the basic parts of a simple electric series circuit? (cells, wires, bulbs, switches, buzzers)

Can they compare and give reasons for variation in how components function, including bulb brightness, buzzer volume and on/off position of switches?

Can they explain how to make changes in a circuit?

Can they explain the impact of changes in a circuit?

Can they explain the effect of changing the voltage of a battery?

Challenging - Can they make their own traffic light system or something similar?

Challenging - Can they explain the danger of short circuits?

Challenging - Can they explain what a fuse is?

Scientists across the Curriculum:

Nikola Tesla – Electrical and Mechanical Engineer who developed the AC electrical system

Alessandro Volta – Physicist who developed the electric battery.

Mildred S Dresselhaus – Materials scientist whose research led to the development of rechargeable batteries