



The **BIG** Picture

Pupils will be introduced to the relationship between structure and function: the idea that every part has a job to do. They will explore questions that focus on the role of the roots and stem in nutrition and support, leaves for nutrition and flowers for reproduction.

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:

photosynthesis, pollen, insect/wind pollination, male, female, seed formation, seed dispersal (wind dispersal, animal dispersal, water dispersal), air, nutrients, minerals, soil, absorb, transport

What do we already know?

- Observe and describe how seeds and bulbs grow into mature plants. (Y2 - Plants)
- Find out and describe how plants need water, light and a suitable temperature to grow and stay healthy. (Y2 - Plants)

Sticky Knowledge:

- Can they identify and describe the functions of different parts of plants? (roots, stem, leaves and flowers)
- Can they identify what a plant needs for life and growth?
- Can they describe the ways in which nutrients, water and oxygen are transported within plants?
- Can they explain how the needs and functions of plant parts vary from plant to plant e.g. insect and wind pollinated plants?
- Can they investigate the way in which water is transported within plants?
- Can they explore the role of flowers in the life cycle of flowering plants including pollination, seed formation and seed dispersal?
- Challenging** - Can they classify using a range of common criteria? (environment found, size, climate required etc)

National Curriculum Knowledge: Year 3:

- Identify and describe the functions of different parts of flowering plants: roots; stem/trunk; leaves; and flowers.
- Explore the requirements of plants for life and growth (air, light, water, nutrients from soil, and room to grow) and how they vary from plant to plant.
- Investigate the way in which water is transported within plants.
- Explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal.

Types of Scientific Enquiry:

- Identifying and classifying
- Fair testing
- Changes over time
- Pattern seeking

Key Knowledge:

Many plants, but not all, have roots, stems/trunks, leaves and flowers/blossom. The roots absorb water and nutrients from the soil and anchor the plant in place. The stem transports water and nutrients/minerals around the plant and holds the leaves and flowers up in the air to enhance photosynthesis, pollination and seed dispersal. The leaves use sunlight and water to produce the plant's food. Some plants produce flowers which enable the plant to reproduce. Pollen, which is produced by the male part of the flower, is transferred to the female part of other flowers (pollination). This forms seeds, sometimes contained in berries or fruits which are then dispersed in different ways. Different plants require different conditions for germination and growth.

Scientists across the Curriculum:

Choose from the following options:
Jan Ingenhousz - Doctor and Scientist who discovered the process of photosynthesis
Carl Linnaeus - Botanist who studies conditions for growing bananas
Charles Henry Turner - Zoologist who made discoveries about insect behaviour
Jagadish Chandra Bose - Biophysicist who measure plant response to different stimuli
George Washington Carver - Agricultural Scientist
Dr Kelsey Byers - Biologist who studies plant smells and how they attract insects



The BIG Picture

Pupils continue to learn about the importance of nutrition and should be introduced to the main body parts associated with the skeleton and muscles. They will also find out how different parts of the body have special functions.

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

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Key vocabulary:

Nutrition, nutrients, carbohydrates, sugars, protein, vitamins, minerals, fibre, fat, water, skeleton, bones, muscles, joints, support, protect, move, skull, ribs, spine

What do we already know?

- Identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals. (Y1 - Animals, including humans)
- Identify and name a variety of common animals that are carnivores, herbivores and omnivores. (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)
- 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)

National Curriculum Knowledge: Year 3:

- 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.

- Types of Scientific Enquiry:

- Identifying and classifying
- Research
- Pattern seeking

Key Knowledge:

Animals, unlike plants which can make their own food, need to eat in order to get the nutrients they need. Food contains a range of different nutrients – carbohydrates (including sugars), protein, vitamins, minerals, fats, sugars, water – and fibre that are needed by the body to stay healthy. A piece of food will often provide a range of nutrients.
Humans, and some other animals, have skeletons and muscles which help them move and provide protection and support.

Sticky Knowledge:

- Can they explain the importance of a nutritious balanced diet?
- Can they describe how nutrients, water and oxygen are transported within animals and humans?
- Can they describe and explain the skeletal system of a human?
- Can they describe and explain the muscular system of a human?
- Challenge** - Can they explain how the muscular and skeletal systems work together to create movement?
- 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:
- Wilhelm Roentgen – Physicist who discovered x-rays
- Marie Curie – Physicist who invented the mobile x-ray machine
- Adelle Davis – Biochemist and Nutritionist who linked to health and diet
- Michelle Williams – Radiologist



The BIG Picture

Pupils will be able to make links with their work in Geography lessons. Pupils will explore different kinds of rocks and soils, including those in the local environment. They will build on their knowledge from materials in year 1 and Year 2. They will be aware that rock is a material and they will know the basic properties of it. They will also be aware of what rock may be used for and why it is suitable for this.

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

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)

Sticky Knowledge:

Can they compare and group together different rocks based on their simple physical properties?

Can they describe and explain how different rocks can be useful to us?

Can they describe and explain the differences between sedimentary and igneous rocks, considering the way they are formed?

Can they describe how fossils are formed within sedimentary rock?

Challenge - Can they classify igneous and sedimentary rocks?

Challenge - Can they begin to relate the properties of rocks with their uses?

NC Objectives:
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National Curriculum Knowledge: 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.

- Types of Scientific Enquiry:

- Identifying and classifying
- Pattern seeking
- Research
- Changes over time

Key Knowledge:

Rock is a naturally occurring material. There are different types of rock e.g. sandstone, limestone, slate etc. which have different properties. Rocks can be hard or soft. They have different sizes of grain or crystal. They may absorb water. Rocks can be different shapes and sizes (stones, pebbles, boulders). Soils are made up of pieces of ground down rock which may be mixed with plant and animal material (organic matter). The type of rock, size of rock pieces and the amount of organic matter affect the property of the soil. Some rocks contain fossils. Fossils were formed millions of years ago. When plants and animals died, they fell to the seabed. They became covered and squashed by other material. Over time the dissolving animal and plant matter is replaced by minerals from the water.

Key vocabulary:

rock, stone, pebble, boulder, grain, crystals, layers, hard, soft, texture, absorb water, fossil, bone, flesh, minerals, marble, chalk, granite, sandstone, slate, soil, types of soil (e.g. peaty, sandy, chalk, clay)

Scientists across the Curriculum:

Choose from the following options:

William Smith – Engineer and Geologist who developed the science for rock strata

James Hutton – Scientist who studied rocks and the effects of natural processes

Florence Bascom – Geologist who studies the origin and formation of mountains

Anjana Khatwa – Geologist who collects rocks and fossils and studies them

Brianna Green – Biochemist who collects soil and studies the effects of climate change



The BIG Picture

Pupils will explore what happens when light reflects off a mirror or other reflective surfaces to help them to answer questions about how light behaves. The children will discuss why it is important to protect their eyes from bright lights and will discuss how dangerous it is to look directly at the sun, even when they are wearing sunglasses. They will explore shadows, finding out how they are formed and what might cause them to change.

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

NC Objectives:
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Key vocabulary:

light, light source, Sun, sunlight, dangerous

What do we already know?

- Explore how things work. (Nursery - Light)
- Talk about the differences in materials and changes they notice. (Nursery - Light)
- Describe what they see, hear and feel whilst outside. (Reception - Light)
- 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)
- Describe the simple physical properties of a variety of everyday materials. (Y1 - Materials)

Sticky Knowledge:

- Can they explain the difference between transparent, translucent and opaque?
- Can they explain what dark is?
- Can they identify light sources?
- Can they explain how we see things?
- Can they compare the brightness and colour of lights?
- Can they identify ways to protect their eyes from the sun?
- Can they explain how shadows are formed?
- Challenge** - Can they explain why lights need to be bright or dimmer according to need?
- Challenge** - Can they explain why their shadow changes when the light source is moved closer or further from the object?

National Curriculum Knowledge: 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.
- **Types of Scientific Enquiry:**
- Identifying and classifying
- Fair testing
- Changes over time

Key Knowledge:

We see objects because our eyes can sense light. Dark is the absence of light. We cannot see anything in complete darkness. Some objects, for example, the sun, light bulbs and candles are sources of light. Objects are easier to see if there is more light. Some surfaces reflect light. Objects are easier to see when there is less light if they are reflective. The light from the sun can damage our eyes and therefore we should not look directly at the sun and can protect our eyes by wearing sunglasses or sunhats in bright light. Shadows are formed on a surface when an opaque or translucent object is between a light source and the surface and blocks some of the light. The size of the shadow depends on the position of the source, object and surface.

Scientists across the Curriculum:

Percy Shaw - Inventor of cat's eye



The BIG Picture

Pupils will be able to observe that magnetic forces can act without direct contact, unlike most forces, where direct contact is necessary (for example, opening a door, pushing a swing). They will explore the behaviour and everyday uses of different magnets (for example, bar, ring, button and horseshoe).

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 - Forces)
- Explore and talk about different forces they can feel. (Nursery - Forces)
- Talk about the differences between materials and changes they notice. (Nursery - Forces)
- Explore the natural world around them. (Reception - Forces)
- Describe what they see, hear and feel whilst outside. (Reception - Forces)
- 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)

Sticky Knowledge:

- Can they observe that magnetic forces can be transmitted without direct contact?
- Can they talk about how some magnets attract or repel each other?
- Can they classify which materials are attracted to magnets?
- Can they describe the speed and direction of moving objects?

Challenge - Can they investigate the strengths of different magnets and find fair ways to compare them?

Challenge - Can they explain why an object will move faster if it is rolling down a hill or a slope?

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Key vocabulary:

Force, push, pull, twist, contact force, non-contact force, magnetic force, magnet, strength, bar magnet, ring magnet, button magnet, horseshoe magnet, attract, repel, magnetic material, metal, iron, steel, poles, north pole, south pole

National Curriculum Knowledge: 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.

Types of Scientific Enquiry:

- Comparative / fair testing
- Identifying and classifying

Key Knowledge:

A force is a push or a pull. When an object moves on a surface, the texture of the surface and the object affect how it moves. It may help the object to move better or it may hinder its movement e.g. ice skater compared to walking on ice in normal shoes. A magnet attracts magnetic material. Iron and nickel and other materials containing these, e.g. stainless steel, are magnetic. The strongest parts of a magnet are the poles. Magnets have two poles - a north pole and a south pole. If two like poles, e.g. two north poles, are brought together they will push away from each other - repel. If two unlike poles, e.g. a north and south, are brought together they will pull together - attract. For some forces to act, there must be contact e.g. a hand opening a door, the wind pushing the trees. Some forces can act at a distance e.g. magnetism. The magnet does not need to touch the object that it attracts.

Scientists across the Curriculum:

Choose from the following options:

William Gilbert - Doctor who developed the theory of magnetism

Leonardo Da Vinci - First person to plan and carry out tests on friction

Eric Laithwaite - Electrical Engineer who developed the technology behind the Maglev train