

Science Progression and Core Knowledge 2022-2023

At Newlands Primary School, we want our children to be curious about the world around them and enable them to make sense of the world in which they live. We want our children to develop an understanding of the uses and implications of Science, how it has changed and shaped our lives and how vital it is to the world's future prosperity.

Our children will be encouraged to understand how science can be used to explain what is occurring, predict how things will behave, and analyse causes. We aim to provide opportunities for the critical evaluation of evidence and rational explanation of scientific phenomena as well as opportunity to apply their mathematical knowledge to their understanding of science, including collecting, presenting and analysing data. Children will be immersed in key scientific vocabulary, which supports in the acquisition of scientific knowledge and understanding.

Early Years Foundation Stage

In the Early Years Foundation Stage children will learn to...

- Explore the natural world around them. (UW)
- Describe what they see, hear and feel whilst outside. (UW)
- Recognise some environments that are different to the one in which they live.(UW)
- Understand the effect of changing seasons on the natural world around them. (UW)
- Know and talk about the different factors that support their overall health and wellbeing(P)

Core Knowledge EYFS

Term 1
All About
Me

- To identify places within the school environment including outside areas
- To understand why we need to brush our teeth
- To recognise how they have changed and grown since babies
- To begin to observe the change in seasons when exploring outside

Term 2
Ant to
Elephant

- To understand that some countries have different climates to where we live
- Identify and name some animals that live in different climates
- To identify mini- beast that live in the garden (spider, ladybird, woodlouse, beetle)

Term 3 Transport	<ul style="list-style-type: none"> ● To identify ways that vehicles could move ● To understand that we travel in different ways to get to different destinations ● To identify different ways to travel to school
Term 4 Spring to life	<ul style="list-style-type: none"> ● To identify what plants need to grow ● To identify the four seasons and their characteristics ● To understand that caterpillars transform into butterflies
Term 5 From Farm to Fork	<ul style="list-style-type: none"> ● To understand that food can come from the soil, trees, plants or animals ● To understand why we need to eat a healthy diet ● To understand that some foods need different climates to grow
Term 6 Coast to country	<ul style="list-style-type: none"> ● To identify animals and creatures that live in the sea ● To show an understand of why we need to keep our oceans clean ● To name features of the beach

	Year 1	Year 2
	<p>Working scientifically</p> <ul style="list-style-type: none"> ● Asking simple questions and recognising that they can be answered in different ways. ● Observing closely, using simple equipment. ● Performing simple tests. ● Identifying and classifying. ● Using their own observations and ideas to suggest ways to answer questions. ● Gathering and recording data to help in answering questions. 	<p>Working scientifically</p> <ul style="list-style-type: none"> ● Asking simple questions and recognising that they can be answered in different ways. ● Observing closely, using simple equipment. ● Performing simple tests. ● Identifying and classifying. ● Using their own observations and ideas to suggest ways to answer questions. ● Gathering and recording data to help in answering questions.
	<ul style="list-style-type: none"> ● Identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals. 	<ul style="list-style-type: none"> ● Notice that animals including humans, have offspring that grow into adults

- Identify and name a variety of common animals that are carnivores, herbivores, and omnivores.
- Describe and compare the structure of a variety of common animals (fish, amphibians, reptiles, birds, and mammals including pets).
- Identify, name, draw and label basic parts of the human body and say which part of the body is associated with each sense.

- Find out about and describe the basic needs of animals, including humans, for survival (water, food and air)
- Describe the importance for humans of exercise, eating the right amounts of different types of food and hygiene

Learning Outcomes Years 1 & 2

Ask simple questions.

- Observe closely, using simple equipment.
- Perform simple tests.
- Identify and classify.
- Use observations and ideas to suggest answers to questions.
- Gather and record data to help in answering questions.
- Identify and name a variety of common plants, including garden plants, wild plants and trees and those classified as deciduous and evergreen.
- Identify and describe the basic structure of a variety of common flowering plants, including roots, stem/trunk, leaves and flowers.
- Observe and describe how seeds and bulbs grow into mature plants.
- Find out and describe how plants need water, light and a suitable temperature to grow and stay healthy.
- Identify and name a variety of common animals that are birds, fish, amphibians, reptiles, mammals and invertebrates.
- Identify and name a variety of common animals that are carnivores, herbivores and omnivores.
- Describe and compare the structure of a variety of common animals (birds, fish, amphibians, reptiles, mammals and invertebrates, including pets).
- Identify name, draw and label the basic parts of the human body and say which part of the body is associated with each sense.
- Notice that animals, including humans, have offspring which grow into adults.
- Investigate and describe the basic needs of animals, including humans, for survival (water, food and air).
- Describe the importance for humans of exercise, eating the right amounts of different types of food and hygiene.
- Explore and compare the differences between things that are living, that are dead and that have never been alive.
- Identify that most living things live in habitats to which they are suited and describe how different habitats provide for the basic needs of different kinds of animals and plants and how they depend on each other.
- Identify and name a variety of plants and animals in their habitats, including micro-habitats.

- Describe how animals obtain their food from plants and other animals, using the idea of a simple food chain, and identify and name different sources of food.
- Identify how humans resemble their parents in many features.
- Distinguish between an object and the material from which it is made.
- Identify and name a variety of everyday materials, including wood, plastic, glass, metal, water and rock.
- Describe the simple physical properties of a variety of everyday materials.
- Compare and group together a variety of everyday materials on the basis of their simple physical properties.
- Find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching.
- Identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick/rock, and paper/cardboard for particular uses.
- Notice and describe how things move, using simple comparisons such as faster and slower.
- Compare how different things move.
- Observe and name a variety of sources of light, including electric lights, flames and the Sun, explaining that we see things because light travels from them to our eyes.
- Observe and name a variety of sources of sound, noticing that we hear with our ears.
- Identify common appliances that run on electricity.
- Construct a simple series electrical circuit.
- Observe the apparent movement of the Sun during the day.
- Observe changes across the four seasons.
- Observe and describe weather associated with the seasons and how day length varies.

Core Knowledge Years 1&2

Term 1	<u>Everyday materials</u> <ul style="list-style-type: none"> ● The shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching. ● Plastic/brick/metal/wood/rock/paper/wool /glass/cardboard are all examples of materials. ● Objects will move quicker and more easily on a smooth surface and slower or less easily on a rougher surface.
Term 2	<u>Seasonal changes</u> <ul style="list-style-type: none"> ● Length of the day light changes depending on the season. ● Weather changes during each of the seasons. ● Different foods grow better at different times of the year.
Term 3	<u>Scientific investigations (animals including humans)</u> <ul style="list-style-type: none"> ● A mammal is a type of animal.

	<ul style="list-style-type: none"> ● A bird has wings. ● A snake is a type of reptile because it has scales and cold blood.
Term 4	<u>Animals including humans</u> <ul style="list-style-type: none"> ● Some animals eat other animals to stay alive. ● All animals need food to stay alive. ● The human body is made up of lots of different parts.
Term 5	Plants <ul style="list-style-type: none"> ● Plants need the correct amount of water, light and a suitable temperature to grow and stay healthy. ● Plants can grow from seeds and bulbs. ● Plants have similar parts that may look different.
Term 6	Living things and habitats <ul style="list-style-type: none"> ● All living things breathe, move, grow and reproduce. ● Most living things live in habitats to which they are suited. ● Plants and animals depend on each other to survive.

	Year 3	Year 4
	<ul style="list-style-type: none"> ● identify and describe the functions of different parts of flowering plants: roots, stem/trunk, leaves and flowers ● explore the 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 	<ul style="list-style-type: none"> ● 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 ● 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

- 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
- 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
- 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
- compare how things move on different surfaces
- notice that some forces need contact between 2 objects, but magnetic forces can act at a distance

- construct and interpret a variety of food chains, identifying producers, predators and prey
- 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 ($^{\circ}\text{C}$)
- identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature
- 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 increase
- 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

- 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 2 poles
- predict whether 2 magnets will attract or repel each other, depending on which poles are facing
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- 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
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Learning Outcomes Year 3 & 4

- 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
- 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
- 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
- compare how things move on different surfaces
- notice that some forces need contact between 2 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 2 poles
- predict whether 2 magnets will attract or repel each other, depending on which poles are facing
- 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
- Plants 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
- 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

Core Knowledge Years 3&4

Term 1

Sound

- Sound is a type of energy.
- Sounds are created by vibrations.
- Pitch is a measure of how high or low a sound is.
- Sound can travel through solids, liquids and gases.
- The loudness of a sound is called volume.
- The size of a vibration is called amplitude.

Term 2

Rocks

- Different rocks and different soils have different properties and appearances, some are hard, some are soft. They are different shapes and

	<p>sizes and have different types of grain or crystal.</p> <ul style="list-style-type: none"> ● Over time rocks have been broken down to form smaller rocks, pebbles, stones and eventually soils. ● Fossils are formed when, some animals were quickly covered by mud or sand soon after their death. As they decomposed, they were covered by more sediment. The hard parts of the animals remained and were squashed and wrapped up in the newly forming rock. After a long time, the remains changed to rock-like minerals which are the same shape as the original animal.
Term 3	<p>Light and shadow</p> <ul style="list-style-type: none"> ● Dark is the absence of light, we cannot see anything in darkness. We can see objects because our eyes can sense light. ● When light is blocked, a shadow is formed. The size of the shadow depends on the position of the light source, object and surface. ● Light from the sun can damage our eyes and skin. Humans can protect their eyes from sunlight by not looking directly at the sun and wearing sunglasses and sunhats.
Term 4	<p>Living things and their habitats - dangers to living things</p> <ul style="list-style-type: none"> ● A habitat is where plants and animals live. ● Environments can change and this can sometimes pose dangers to living things. ● Large changes to the environment include fire or floods. Availability of food is an important factor when considering how animals respond to change in the environment.
Term 5	<p>Plants</p> <ul style="list-style-type: none"> ● Many plants, but not all, have roots, stems/trunks, leaves and flowers/ blossom. ● Roots anchor the plant into the ground and absorb water and nutrients from the soil. Stems and trunks hold the plant upright and transport water and nutrients around the plant and holds the leaves/ flowers in the air to enhance photosynthesis, pollination and seed dispersal. The leaves use sunlight and water to produce food for the plant. Some plants produce flowers which enable the plant to reproduce. ● Flowering plants produce seeds. The seeds can be dispersed in different ways, such as dropping, wind, carrying, water, eating and bursting.
Term 6	<p>Animals including humans</p> <ul style="list-style-type: none"> ● All animals, including humans cannot make their own food; they get nutrition from what they eat. They need the right types and amounts of nutrition to thrive and grow. ● 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. ● Humans and some other animals have skeletons to support and protect their bodies. Muscles are connected to bones and relax and contract to move them.

	Year 5	Year 6
	<ul style="list-style-type: none"> ● describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird ● describe the life process of reproduction in some plants and animals ● describe the changes as humans develop to old age ● compare and group together everyday materials on the basis of their properties, including their hardness, solubility, transparency, conductivity (electrical and thermal), and response to magnets ● know that some materials will dissolve in liquid to form a solution, and describe how to recover a substance from a solution ● use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating ● give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic ● demonstrate that dissolving, mixing and changes of state are reversible changes ● explain that some changes result in the formation of new materials, and that this kind of change is not usually reversible, including changes associated with burning and the action of acid on bicarbonate of soda 	<ul style="list-style-type: none"> ● 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 ● 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 ● 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 ● 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

- describe the movement of the Earth and other planets relative to the sun in the solar system
- describe the movement of the moon relative to the Earth
- describe the sun, Earth and moon as approximately spherical bodies
- use the idea of the Earth's rotation to explain day and night and the apparent movement of the sun across the sky
- explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object
- identify the effects of air resistance, water resistance and friction, that act between moving surfaces
- recognise that some mechanisms including levers, pulleys and gears allow a smaller force to have a greater effect

- use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them
- 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

Learning Outcomes Years 5 & 6

Plan enquiries, including recognising and controlling variables where necessary.

- Use appropriate techniques, apparatus, and materials during fieldwork and laboratory work.
- Take measurements, using a range of scientific equipment, with increasing accuracy and precision.
- Record data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, bar and line graphs, and models.
- Report findings from enquiries, including oral and written explanations of results, explanations involving causal relationships, and conclusions.
- Present findings in written form, displays and other presentations.
- Use test results to make predictions to set up further comparative and fair tests.
- Use simple models to describe scientific ideas, identifying scientific evidence that has been used to support or refute ideas or arguments.
- Relate knowledge of plants to studies of evolution and inheritance.
- Relate knowledge of plants to studies of all living things.
- Describe the changes as humans develop to old age.
- Identify and name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood.
- Recognise the importance of diet, exercise, drugs and lifestyle on the way the human body functions.
- Describe the ways in which nutrients and water are transported within animals, including humans.

- Describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird.
- Describe the life process of reproduction in some plants and animals.
- Describe how living things are classified into broad groups according to common observable characteristics.
- Give reasons for classifying plants and animals based on specific characteristics.
- 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.
- Compare and group together everyday materials based on evidence from comparative and fair tests, including their hardness, solubility, conductivity (electrical and thermal), and response to magnets.
- Understand how some materials will dissolve in liquid to form a solution and describe how to recover a substance from a solution.
- Use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating.
- Give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic.
- Demonstrate that dissolving, mixing and changes of state are reversible changes.
- Explain that some changes result in the formation of new materials, and that this kind of change is not usually reversible, including changes associated with burning, oxidation and the action of acid on bicarbonate of soda.

Magnets

- Describe magnets as having two poles.
- Predict whether two magnets will attract or repel each other, depending on which poles are facing.

Forces

- Explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object.
- Identify the effect of drag forces, such as air resistance, water resistance and friction that act between moving surfaces.
- Describe, in terms of drag forces, why moving objects that are not driven tend to slow down.
- Understand that force and motion can be transferred through mechanical devices such as gears, pulleys, levers and springs.
- Understand that some mechanisms including levers, pulleys and gears, allow a smaller force to have a greater effect.
- Understand 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 eyes.
- Use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them, and to predict the size of shadows when the position of the light source changes.
- 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.
- 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.

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

Core Knowledge Years 5&6

Term 1	<p>Space</p> <ul style="list-style-type: none"> ● Earth rotates on its axis and makes a complete rotation over 24 hours (a day). This rotation causes day and night. ● Earth orbits the sun. It takes 365 and a quarter days (a year) to complete this orbit. The moon orbits Earth, it takes approximately 28 days to complete this orbit. ● The sun, Earth and the moon are approximately spherical.
Term 2	<p>Properties & changes of materials - separating mixtures</p> <ul style="list-style-type: none"> ● There are different techniques to separate mixtures including filtering, sieving and evaporation. ● Some substances (such as candyfloss) dissolve in water whilst others (such as dried herbs) do not. A dissolved solid can be separated from a solution through evaporation of the liquid. ● The substance that dissolves to form a solution is called a solute. The substance in which a solute will dissolve is called a solvent.
Term 3	<p>Light</p> <ul style="list-style-type: none"> ● Light appears to travel in straight lines. ● We see things because light travels from a source where it enters the eye or from a light source to an object then to the eye, causing images to be seen. ● The shape of the shadow is the same as the shape of the object that cast it because light travels in a straight line.
Term 4	<p>Evolution and inheritance</p> <ul style="list-style-type: none"> ● Evolution by means of natural selection occurs over time. Plants and animals are adapted to suit their environment in different ways, some beneficial adaptations may lead to evolution. ● Living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago. ● Living things produce offspring of the same kind, but that normally such offspring vary and are not identical to their parents.

Term 5	<p>Living things and their habitats</p> <ul style="list-style-type: none">● Plants and animals have life cycles and reproduction is a part of this cycle.● Each life cycle has distinct stages, although these stages are common to all animals, they vary significantly among species. Insects, birds and reptiles are born from an egg, mammals develop as embryos inside the mothers' bodies.● Reproduction is when an animal or plant produces one or more individuals similar to itself: There are two types - asexual reproduction, where offspring gets genes from one parent so they are clones of their parents and sexual reproduction where offspring get genes from both parents so they inherit a mix of features from both.
Term 6	<p>Animals including humans</p> <ul style="list-style-type: none">● The heart pumps blood to transport oxygen, water and other nutrients around the body.● Blood is transported through veins, ventricles and valves.● Diet, exercise and lifestyle choices all impact on the way our bodies function.