Allenton Community Primary School

Progression Map

Science

Vision for Science at Allenton Community Primary School

At Allenton Community Primary School, our vision is to ensure all pupils develop scientific knowledge and conceptual understanding through the disciplines of biology, chemistry and physics. Science teaching will develop pupils' natural curiosity and will develop skills associated with the process of enquiry. We ensure our pupils understand science so they are aware of the implications of science today and in the future. The school's approach to science takes account of the school's own context by providing opportunities for educational experiences and visits, in a variety of settings.

Science Yearly Overview

	Autumn	Spring	Summer
EYFS	All about me Houses and Homes (materials) Festivals and celebrations Seasons	Superheroes Animals (where they live) Seasons	Everything changes – Lifecycles Let's pretend – Fairy tales Seasons
Year 1	Animals		Weather
Year 2		Plants	Materials
Year 3	Rocks and Soils	Living things and their habitats	
Year 4	Light and electricity	Forces and magnets	
Year 5	Space		Properties and changes of materials
Year 6		Evolution and Inheritance	The heart and other organs

In addition to the topics above, there are individual science days, each half term, which focus on retrieval of learning from previous year groups as well as making links to new learning.

Links to Learning in EYFS

Communication and Language

Understand ‘why’ questions, like: “Why does ice cream melt when it is left out?”
Talk about what they see, using a wide vocabulary.
Learn new vocabulary.
Articulate their ideas and thoughts in well-formed sentences.
Describe events in some detail.
Use talk to help work out problems and organise thinking and activities, and to explain how things work and why they might happen.
Use new vocabulary in different contexts.

Personal, social and emotional

Make healthy choices about food, drink, activity and toothbrushing.

Understanding the world

Explore how things work.
Plant seeds and care for growing plants.
Understand the key features of the life cycle of a plant and an animal.
Begin to understand the need to respect and care for the natural environment and all living things.
Explore and talk about different forces they can feel.
Talk about the differences between materials and changes they notice.

Year 1	Focus: Animals				
Working Scientifically Skills					
Asking questions and recognising that they can be answered in different ways	Making observations and taking measurements	Engaging in practical enquiry to answer questions	Recording and presenting evidence	Answering questions and concluding	Evaluating and raising further questions and predictions
Asking simple questions and recognising that they can be answered in different ways • While exploring the world, the children develop their ability to ask questions (such as what something is, how things are similar and different, the ways things work, which alternative is better, how things change and how they happen). Where appropriate, they answer these questions. • The children answer questions developed with the teacher often through a scenario. • The children are involved in planning how to use resources provided to answer the questions using different types of enquiry, helping them to recognise that there are different ways in which questions can be answered.	**Observing closely, using simple equipment** • Children explore the world around them. They make careful observations to support identification, comparison and noticing change. They use appropriate senses, aided by equipment such as magnifying glasses or digital microscopes, to make their observations. • They begin to take measurements, initially by comparisons, then using non-standard units.	**Performing simple tests** • The children use practical resources provided to gather evidence to answer questions generated by themselves or the teacher. They carry out: tests to classify; comparative tests; pattern seeking enquiries; and make observations over time. **Identifying and classifying** • Children use their observations and testing to compare objects, materials and living things. They sort and group these things, identifying their own criteria for sorting. • They use simple secondary sources (such as identification sheets) to name living things. They describe the characteristics they used to identify a living thing.	**Gathering and recording data to help in answering questions** • The children record their observations e.g. using photographs, videos, drawings, labelled diagrams or in writing. • They record their measurements e.g. using prepared tables, pictograms, tally charts and block graphs. • They classify using simple prepared tables and sorting rings.	**Using their observations and ideas to suggest answers to questions** • Children use their experiences of the world around them to suggest appropriate answers to questions. They are supported to relate these to their evidence e.g. observations they have made, measurements they have taken or information they have gained from secondary sources. **Using their observations and ideas to suggest answers to questions** • The children recognise 'biggest and smallest', 'best and worst' etc. from their data.	Children in KS1 are not expected to evaluate. However, children should be encouraged to consider their method and adapt this where necessary. Children in KS1 are not expected to make scientific predictions as they do not have the subject knowledge to do this. That does not mean that they cannot what they think may happen, but this will be based on experience or may simply be a guess.

Knowledge

What types of animals there and how are their offspring similar to them?

Animals can be divided into 3 groups depending on what they eat: carnivores, herbivores and omnivores.

Animals, including humans are living things and have offspring which grow into adults. In humans and some animals, these offspring will be young, such as babies or kittens, that grow into adults. In other animals, such as chickens or insects, there may be eggs laid that hatch to young or other stages which then grow to adults. The young of some animals do not look like their parents e.g. tadpoles.

What do humans and animals look like?

Parts of the human body include: head, hair, eye, ear, tongue, neck, arm, finger, foot, eyebrow, face, nose, lip, mouth, hand, elbow, knee, leg

Humans have 5 senses: smell, sight, touch, hearing and taste.

Animals vary in many ways having different structures e.g. wings, tails, ears etc. They also have different skin coverings e.g. scales, feathers, hair. These key features can be used to identify them.

What do animals and humans eat?

All animals, including humans, have the basic needs of feeding, drinking and breathing that must be satisfied in order to survive. Animals eat certain things - some eat other animals, some eat plants, some eat both plants and animals. A food chain is used to show how energy passes between plants and animals (the arrows show the direction that the energy flows).

To grow into healthy adults, humans need the right amounts and types of food and exercise. Good hygiene is also important in preventing infections and illnesses.

Where do animals live?

The animals in a habitat depend on each other for food and shelter, etc.

Animals live in a habitat to which they are suited, which means that animals have suitable features that help them move and find food and plants have suitable features that help them to grow well.

The habitat provides the basic needs of the animals– shelter, food and water.

How do animals and humans perceive the world around them?

Humans have key parts in common, but these vary from person to person.
Humans (and other animals) find out about the world using their senses. Humans have five senses – sight, touch, taste, hearing and smelling. These senses are linked to particular parts of the body.

How do we know if things are dead or alive?

All objects are either living, dead or have never been alive. Dead things include dead animals and plants and parts of plants and animals that are no longer attached e.g. leaves and twigs, shells, fur, hair and feathers. An object made of wood is classed as dead. Objects made of rock, metal and plastic have never been alive (ignoring that plastics are made of fossil fuels).

Vocabulary

Carnivore, herbivore, omnivore, offspring, habitat, microhabitat, senses, living, dead

Year 1	Focus: Weather				
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Knowledge

How does the weather affect the amount of daylight?

In the UK, the length of daylight is the longest at mid-summer (about 16 hours of daylight) and gets shorter each day until mid-winter (about 8 hours of daylight) before getting longer again.

What are the seasons and how might they impact animals?

The UK has 4 seasons: spring, summer, autumn and winter

The weather also changes with the seasons. In the UK, it is usually colder and rainier in winter, and hotter and drier in the summer. The change in weather causes many other changes. Some examples are: numbers of minibeasts found outside; seed and plant growth; leaves on trees; and type of clothes worn by people.

Vocabulary

Sun, day length, temperature, seasons, weather, spring, summer, autumn, winter, sunrise, sunset

Year 2	Focus: Materials				
Working Scientifically Skills					
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Knowledge

What materials are objects made out of?

All objects are made of one or more materials. Some objects can be made from a range of different materials e.g. plastic, metal or wooden spoons.

What are the properties of different materials?

Materials can be described by their properties e.g. shiny, stretchy, rough etc. Some materials e.g. plastic can be in different forms with very different properties. For example:

Material	Properties
Wood	Hard, stiff, strong, opaque, can be carved into any shape
Plastic	Waterproof, strong, can be made to be flexible or stiff, smooth or rough
Glass	Waterproof, transparent, hard, smooth
Metal	Strong, hard, easy to wash
Paper	Lightweight, flexible
Cardboard	Strong, light, stiff
Fabric	Soft, flexible, hard-wearing, can be stretchy, warm, absorbent
Rubber	Hard-wearing, elastic, flexible, strong

How do the properties match the purpose?

All objects are made of one or more materials that are chosen specifically because they have suitable properties for the task. For example, a water bottle is made of plastic because it is transparent allowing you to see the drink inside and waterproof so that it holds the water.

When choosing what to make an object from, the properties needed are compared with the properties of the possible materials, identified through simple tests and classifying activities. A material can be suitable for different purposes and an object can be made of different materials.

How can materials change?

Objects made of some materials can be changed in shape by bending, stretching, squashing and twisting. For example, clay can be shaped by squashing, stretching, rolling, pressing etc. This can be a property of the material or depend on how the material has been processed e.g. thickness.

Vocabulary

Object, material, properties, physical, suitability, solid, hard, soft, stretchy, shiny, dull, rough, smooth, bendy, waterproof, absorbent, transparent, opaque

Year 2	Focus: Plants				
Working Scientifically Skills					
Asking questions and recognising that they can be answered in different ways	Making observations and taking measurements	Engaging in practical enquiry to answer questions	Recording and presenting evidence	Answering questions and concluding	Evaluating and raising further questions and predictions
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Knowledge

How are plants identified?

Growing locally, there will be a vast array of plants which all have specific names. These can be identified by looking at the key characteristics of the plant. Plants have common parts, but they vary between the different types of plants. Some trees keep their leaves all year (evergreen) while other trees drop their leaves during autumn and grow them again during spring (deciduous).

What are the parts of a plant and tree called?

The parts of a plant are: root, stem, leaves and flower

The parts of a tree are: roots, trunk, bark, crown, branches and leaves (trees can also produce flowers, seeds, berries and fruit).

How do plants grow?

Plants may grow from either seeds or bulbs. These then germinate and grow into seedlings which then continue to grow into mature plants. These mature plants may have flowers which then develop into seeds, berries, fruits etc. Seeds and bulbs need to be planted outside at particular times of year and they will germinate and grow at different rates.

What do plants need to grow well?

To grow well, plants need: room to grow, light, water, air and nutrients (usually from soil).

What nutrients do plants need to survive and how do they get it?

Some plants are better suited to growing in full sun and some grow better in partial or full shade. Plants also need different amounts of water and space to grow well and stay healthy. 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.

How do plants reproduce?

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.

Vocabulary

Seed, root, flower, stem, leaf/leaves, deciduous, evergreen, germinate, nutrients, absorb, photosynthesis, pollination, dispersal, reproduce

Year 3	Focus: Living things and their habitat				
Working Scientifically Skills					
Asking questions and recognising that they can be answered in different ways	Making observations and taking measurements	Engaging in practical enquiry to answer questions	Recording and presenting evidence	Answering questions and concluding	Evaluating and raising further questions and predictions
Asking relevant questions and using different types of scientific enquiries to answer them • The children consider their prior knowledge when asking questions. They independently use a range of question stems. Where appropriate, they answer these questions. • The children answer questions posed by the teacher. • Given a range of resources, the children decide for themselves how to gather evidence to answer the question. They recognise when secondary sources can be used to answer questions that cannot be answered through practical work. They identify the type of enquiry that they have chosen to answer their question.	**Making systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers** • The children make systematic and careful observations. • They use a range of equipment for measuring length, time, temperature and capacity. They use standard units for their measurements.	**Setting up simple practical enquiries, comparative and fair tests** • The children select from a range of practical resources to gather evidence to answer questions generated by themselves or the teacher. • They follow their plan to carry out: observations and tests to classify; comparative and simple fair tests; observations over time; and pattern seeking.	**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** • The children sometimes decide how to record and present evidence. They record their observation e.g. using photographs, videos, pictures, labelled diagrams or writing. They record their measurements e.g. using tables, tally charts and bar charts (given templates, if required, to which they can add headings). They record classifications e.g. using tables, Venn diagrams, Carroll diagrams. • Children are supported to present the same data in different ways in order to help with answering the question.	**Using straightforward scientific evidence to answer questions or to support their findings.** • Children answer their own and others' questions based on observations they have made, measurements they have taken or information they have gained from secondary sources. The answers are consistent with the evidence. **Identifying differences, similarities or changes related to simple scientific ideas and processes** • Children interpret their data to generate simple comparative statements based on their evidence. They begin to identify naturally occurring patterns and causal relationships. ***Using results to draw simple conclusions*** • They draw conclusions based on their evidence and current subject knowledge.	***Using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions*** • They identify ways in which they adapted their method as they progressed or how they would do it differently if they repeated the enquiry.

Knowledge

How do animals and plants get nutrients?

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.

Food chains are used to show the source of food for different living things. They start with a producer. Predators eat prey. The arrows show the flow of energy through the food chain.

How are humans, animals and plants classified?

Humans, and some other animals, have skeletons and muscles which help them move and provide protection and support. Animals with backbones are called vertebrates. Animals without a backbone are called invertebrates.

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

What can impact a plant or animal's habitat?

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).

Environments also change with the seasons; different living things can be found in a habitat at different times of the year.

How do teeth impact human activity?

Humans have four types of teeth: incisors for cutting food into smaller bits; canines for tearing; premolars for crushing; and molars for crushing and grinding (chewing).

How do animals process food?

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.

Vocabulary

Nutrition, carbohydrate, protein, vitamins, minerals, skeleton, muscle, vertebrate, invertebrate, classification, producer, prey, predator, teeth, digestion, salvia, oesophagus, small intestine, liver, large intestine, rectum

Year 3	Focus: Rocks and Soils				
Working Scientifically Skills					
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Knowledge

What are the different types of rock?

Rock is a naturally occurring material. There are different types of rock which have different properties, e.g. sandstone, limestone, slate, etc..

What are the different properties of rocks?

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). The type of rock, size of rock pieces and the amount of organic matter affect the property of the soil. Soil is a type of rock (soils are made up of pieces of ground down rock which may be mixed with plant and animal material (organic matter)).

What are fossils and how are they formed?

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.

What is a solid, liquid and a gas?

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.

How can an object change state?

Melting is a state change from solid to liquid. Freezing is a state change from liquid to solid. The freezing point of water is $0^{o}C$. 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 $100^{o}C$. 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.

What is the water cycle? (covered in Geography Rivers topic)

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.

Vocabulary

Material, properties, absorb, organic matter, dissolved, volume, solid, liquid, gas, change of state, boiling, freezing, melting, evaporation, condensation

Year 4	Focus: Light and electricity				
Working Scientifically Skills					
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Knowledge

Light

What are the sources of light?

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.

How could light be dangerous?

The light from the sun can damage our eyes. Therefore, we should not look directly at the sun and can protect our eyes by wearing sunglasses or sunhats in bright light.

How are shadows formed?

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.

Electricity

What uses electricity?

Many household devices and appliances run on electricity. Some plug in to the mains and others run on batteries.

What is an electrical circuit?

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.

Circuit diagrams should be drawn using pictures (circuit symbols will be taught in Y6)

What are conductors and insulators?

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.

Sound

How does sound travel?

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.

How can sound change?

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.

Vocabulary

Light, dark, reflect, shadow, opaque, translucent, component, insulator, conductor, medium, vacuum, pitch, volume, vibrations

Year 4	Focus: Forces and Magnets				
Working Scientifically Skills					
Asking questions and recognising that they can be answered in different ways	Making observations and taking measurements	Engaging in practical enquiry to answer questions	Recording and presenting evidence	Answering questions and concluding	Evaluating and raising further questions and predictions
Asking relevant questions and using different types of scientific enquiries to answer them • The children consider their prior knowledge when asking questions. They independently use a range of question stems. Where appropriate, they answer these questions. • The children answer questions posed by the teacher. • Given a range of resources, the children decide for themselves how to gather evidence to answer the question. They recognise when secondary sources can be used to answer questions that cannot be answered through practical work. They identify the type of enquiry that they have chosen to answer their question.	**Making systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers** • The children make systematic and careful observations. • They use a range of equipment for measuring length, time, temperature and capacity. They use standard units for their measurements.	**Setting up simple practical enquiries, comparative and fair tests** • The children select from a range of practical resources to gather evidence to answer questions generated by themselves or the teacher. • They follow their plan to carry out: observations and tests to classify; comparative and simple fair tests; observations over time; and pattern seeking.	**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** • The children sometimes decide how to record and present evidence. They record their observation e.g. using photographs, videos, pictures, labelled diagrams or writing. They record their measurements e.g. using tables, tally charts and bar charts (given templates, if required, to which they can add headings). They record classifications e.g. using tables, Venn diagrams, Carroll diagrams. • Children are supported to present the same data in different ways in order to help with answering the question.	**Using straightforward scientific evidence to answer questions or to support their findings.** • Children answer their own and others' questions based on observations they have made, measurements they have taken or information they have gained from secondary sources. The answers are consistent with the evidence. **Identifying differences, similarities or changes related to simple scientific ideas and processes** • Children interpret their data to generate simple comparative statements based on their evidence. They begin to identify naturally occurring patterns and causal relationships. ***Using results to draw simple conclusions*** • They draw conclusions based on their evidence and current subject knowledge.	***Using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions*** • They identify ways in which they adapted their method as they progressed or how they would do it differently if they repeated the enquiry.

Knowledge

Forces

What is a force?

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.

Magnets

What is a magnet and how do they work?

A magnet attracts magnetic material. Iron and nickel and other materials containing these, e.g. stainless steel, are magnetic. Not all metals are magnetic, e.g. aluminium, gold, silver and copper.

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.

Vocabulary

Force, surface, texture, magnet, pole, repel, attract

Year 5	Focus: Space				
Working Scientifically Skills					
Asking questions and recognising that they can be answered in different ways	Making observations and taking measurements	Engaging in practical enquiry to answer questions	Recording and presenting evidence	Answering questions and concluding	Evaluating and raising further questions and predictions
Planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary • Children independently ask scientific questions. This may be stimulated by a scientific experience or involve asking further questions based on their developed understanding following an enquiry. • Given a wide range of resources the children decide for themselves how to gather evidence to answer a scientific question. They choose a type of enquiry to carry out and justify their choice. They recognise how secondary sources can be used to answer questions that cannot be answered through practical work.	**Taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate** • The children select measuring equipment to give the most precise results e.g. ruler, tape measure or trundle wheel, force meter with a suitable scale. • During an enquiry, they make decisions e.g. whether they need to: take repeat readings (fair testing); increase the sample size (pattern seeking); adjust the observation period and frequency (observing over time); or check further secondary sources (researching); in order to get accurate data (closer to the true value).	***Planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary*** • The children select from a range of practical resources to gather evidence to answer their questions. They carry out fair tests, recognising and controlling variables. They decide what observations or measurements to make over time and for how long. They look for patterns and relationships using a suitable sample.	**Recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs** • The children decide how to record and present evidence. They record observations e.g. using annotated photographs, videos, labelled diagrams, observational drawings, labelled scientific diagrams or writing. They record measurements e.g. using tables, tally charts, bar charts, line graphs and scatter graphs. They record classifications e.g. using tables, Venn diagrams, Carroll diagrams and classification keys. • Children present the same data in different ways in order to help with answering the question.	**Identifying scientific evidence that has been used to support or refute ideas or arguments** • Children answer their own and others' questions based on observations they have made, measurements they have taken or information they have gained from secondary sources. • They talk about how their scientific ideas change due to new evidence that they have gathered. • They talk about how new discoveries change scientific understanding. ***Reporting and presenting findings from enquiries, including conclusions*** • In their conclusions, children: identify causal relationships and patterns in the natural world from their evidence; identify results that do not fit the overall pattern; and explain their findings using their subject knowledge.	***Reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations*** • They evaluate, for example, the choice of method used, the control of variables, the precision and accuracy of measurements and the credibility of secondary sources used. • They identify any limitations that reduce the trust they have in their data.

Knowledge

What is the solar system?

The Sun is a star. It is at the centre of our solar system. There are 8 planets: Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, Neptune. These travel around the Sun in fixed orbits.

The Sun, Earth and Moon are approximately spherical.

The Earth takes 365¼ days to complete its orbit around the Sun. The Earth rotates (spins) on its axis every 24 hours. As Earth rotates half faces the Sun (day) and half is facing away from the Sun (night). As the Earth rotates, the Sun appears to move across the sky.

The Moon orbits the Earth. It takes about 28 days to complete its orbit.

What natural forces are used on Earth?

A force causes an object to start moving, stop moving, speed up, slow down or change direction. Gravity is a force that acts at a distance. Everything is pulled to the Earth by gravity. This causes unsupported objects to fall.

Air resistance, water resistance and friction are contact forces that act between moving surfaces. The object may be moving through the air or water, or the air and water may be moving over a stationary object.

To be covered in D&T alongside Mechanical Systems:

A mechanism is a device that allows a small force to be increased to a larger force.

The pay back is that it requires a greater movement. The small force moves a long distance and the resulting large force moves a small distance, e.g. a crowbar or bottle top remover. Pulleys, levers and gears are all mechanisms, also known as simple machines.

Vocabulary

Sun, moon, star, planet, sphere, spherical bodies, satellite, orbit, rotate, axis, astronomer, gravity, resistance, friction

Year 5	Focus: Properties and changes of materials				
Working Scientifically Skills					
Asking questions and recognising that they can be answered in different ways	Making observations and taking measurements	Engaging in practical enquiry to answer questions	Recording and presenting evidence	Answering questions and concluding	Evaluating and raising further questions and predictions
Planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary • Children independently ask scientific questions. This may be stimulated by a scientific experience or involve asking further questions based on their developed understanding following an enquiry. • Given a wide range of resources the children decide for themselves how to gather evidence to answer a scientific question. They choose a type of enquiry to carry out and justify their choice. They recognise how secondary sources can be used to answer questions that cannot be answered through practical work.	**Taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate** • The children select measuring equipment to give the most precise results e.g. ruler, tape measure or trundle wheel, force meter with a suitable scale. • During an enquiry, they make decisions e.g. whether they need to: take repeat readings (fair testing); increase the sample size (pattern seeking); adjust the observation period and frequency (observing over time); or check further secondary sources (researching); in order to get accurate data (closer to the true value).	***Planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary*** • The children select from a range of practical resources to gather evidence to answer their questions. They carry out fair tests, recognising and controlling variables. They decide what observations or measurements to make over time and for how long. They look for patterns and relationships using a suitable sample.	**Recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs** • The children decide how to record and present evidence. They record observations e.g. using annotated photographs, videos, labelled diagrams, observational drawings, labelled scientific diagrams or writing. They record measurements e.g. using tables, tally charts, bar charts, line graphs and scatter graphs. They record classifications e.g. using tables, Venn diagrams, Carroll diagrams and classification keys. • Children present the same data in different ways in order to help with answering the question.	**Identifying scientific evidence that has been used to support or refute ideas or arguments** • Children answer their own and others' questions based on observations they have made, measurements they have taken or information they have gained from secondary sources. • They talk about how their scientific ideas change due to new evidence that they have gathered. • They talk about how new discoveries change scientific understanding. ***Reporting and presenting findings from enquiries, including conclusions*** • In their conclusions, children: identify causal relationships and patterns in the natural world from their evidence; identify results that do not fit the overall pattern; and explain their findings using their subject knowledge.	***Reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations*** • They evaluate, for example, the choice of method used, the control of variables, the precision and accuracy of measurements and the credibility of secondary sources used. • They identify any limitations that reduce the trust they have in their data.

Knowledge
<u>What are the properties of materials?</u> Materials have different uses depending on their properties and state (liquid, solid, gas). Properties include hardness, transparency, electrical and thermal conductivity and attraction to magnets. <u>How do materials change state?</u> Some materials will dissolve in a liquid and form a solution while others are insoluble and form sediment. Mixtures can be separated by filtering, sieving and evaporation. Some changes to materials such as dissolving, mixing and changes of state are reversible, but some changes such as burning wood, rusting and mixing vinegar with bicarbonate of soda result in the formation of new materials and these are not reversible (irreversible).
Vocabulary
Acid, mixture, filter, sieve, evaporate, insoluble, sediment, reversible, irreversible

Year 5	Focus: Light				
Working Scientifically Skills					
Asking questions and recognising that they can be answered in different ways	Making observations and taking measurements	Engaging in practical enquiry to answer questions	Recording and presenting evidence	Answering questions and concluding	Evaluating and raising further questions and predictions
Planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary • Children independently ask scientific questions. This may be stimulated by a scientific experience or involve asking further questions based on their developed understanding following an enquiry. • Given a wide range of resources the children decide for themselves how to gather evidence to answer a scientific question. They choose a type of enquiry to carry out and justify their choice. They recognise how secondary sources can be used to answer questions that cannot be answered through practical work.	**Taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate** • The children select measuring equipment to give the most precise results e.g. ruler, tape measure or trundle wheel, force meter with a suitable scale. • During an enquiry, they make decisions e.g. whether they need to: take repeat readings (fair testing); increase the sample size (pattern seeking); adjust the observation period and frequency (observing over time); or check further secondary sources (researching); in order to get accurate data (closer to the true value).	***Planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary*** • The children select from a range of practical resources to gather evidence to answer their questions. They carry out fair tests, recognising and controlling variables. They decide what observations or measurements to make over time and for how long. They look for patterns and relationships using a suitable sample.	**Recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs** • The children decide how to record and present evidence. They record observations e.g. using annotated photographs, videos, labelled diagrams, observational drawings, labelled scientific diagrams or writing. They record measurements e.g. using tables, tally charts, bar charts, line graphs and scatter graphs. They record classifications e.g. using tables, Venn diagrams, Carroll diagrams and classification keys. • Children present the same data in different ways in order to help with answering the question.	**Identifying scientific evidence that has been used to support or refute ideas or arguments** • Children answer their own and others' questions based on observations they have made, measurements they have taken or information they have gained from secondary sources. • They talk about how their scientific ideas change due to new evidence that they have gathered. • They talk about how new discoveries change scientific understanding. ***Reporting and presenting findings from enquiries, including conclusions*** • In their conclusions, children: identify causal relationships and patterns in the natural world from their evidence; identify results that do not fit the overall pattern; and explain their findings using their subject knowledge.	***Reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations*** • They evaluate, for example, the choice of method used, the control of variables, the precision and accuracy of measurements and the credibility of secondary sources used. • They identify any limitations that reduce the trust they have in their data.

Knowledge

How does light travel?

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.

How are shadows formed?

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

Vocabulary

Reflect, shadow, transparent

Year 6	Focus: Evolution and Inheritance				
Working Scientifically Skills					
Asking questions and recognising that they can be answered in different ways	Making observations and taking measurements	Engaging in practical enquiry to answer questions	Recording and presenting evidence	Answering questions and concluding	Evaluating and raising further questions and predictions
Planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary • Children independently ask scientific questions. This may be stimulated by a scientific experience or involve asking further questions based on their developed understanding following an enquiry. • Given a wide range of resources the children decide for themselves how to gather evidence to answer a scientific question. They choose a type of enquiry to carry out and justify their choice. They recognise how secondary sources can be used to answer questions that cannot be answered through practical work.	**Taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate** • The children select measuring equipment to give the most precise results e.g. ruler, tape measure or trundle wheel, force meter with a suitable scale. • During an enquiry, they make decisions e.g. whether they need to: take repeat readings (fair testing); increase the sample size (pattern seeking); adjust the observation period and frequency (observing over time); or check further secondary sources (researching); in order to get accurate data (closer to the true value).	***Planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary*** • The children select from a range of practical resources to gather evidence to answer their questions. They carry out fair tests, recognising and controlling variables. They decide what observations or measurements to make over time and for how long. They look for patterns and relationships using a suitable sample.	**Recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs** • The children decide how to record and present evidence. They record observations e.g. using annotated photographs, videos, labelled diagrams, observational drawings, labelled scientific diagrams or writing. They record measurements e.g. using tables, tally charts, bar charts, line graphs and scatter graphs. They record classifications e.g. using tables, Venn diagrams, Carroll diagrams and classification keys. • Children present the same data in different ways in order to help with answering the question.	**Identifying scientific evidence that has been used to support or refute ideas or arguments** • Children answer their own and others' questions based on observations they have made, measurements they have taken or information they have gained from secondary sources. • They talk about how their scientific ideas change due to new evidence that they have gathered. • They talk about how new discoveries change scientific understanding. ***Reporting and presenting findings from enquiries, including conclusions*** • In their conclusions, children: identify causal relationships and patterns in the natural world from their evidence; identify results that do not fit the overall pattern; and explain their findings using their subject knowledge.	***Reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations*** • They evaluate, for example, the choice of method used, the control of variables, the precision and accuracy of measurements and the credibility of secondary sources used. • They identify any limitations that reduce the trust they have in their data.

Knowledge

What are characteristics of living things?

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

Plants can make their own food whereas animals cannot.

How can animals be grouped?

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.

How can plants be grouped?

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

How do living things reproduce?

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.

Different groups of animals have different life cycles. Some animals have stages that look very different from the adult of the species, e.g. tadpole and frog, larva and beetle.

How do animals and plants evolve to suit their environment?

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.

Vocabulary

Adaptation, characteristics, evolution, species, inherit, reproduction, offspring, variation, traits, classify, microorganism, fossil, environment, habitat

Year 6	Focus: The heart and other organs				
Working Scientifically Skills					
Asking questions and recognising that they can be answered in different ways	Making observations and taking measurements	Engaging in practical enquiry to answer questions	Recording and presenting evidence	Answering questions and concluding	Evaluating and raising further questions and predictions
Planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary • Children independently ask scientific questions. This may be stimulated by a scientific experience or involve asking further questions based on their developed understanding following an enquiry. • Given a wide range of resources the children decide for themselves how to gather evidence to answer a scientific question. They choose a type of enquiry to carry out and justify their choice. They recognise how secondary sources can be used to answer questions that cannot be answered through practical work.	**Taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate** • The children select measuring equipment to give the most precise results e.g. ruler, tape measure or trundle wheel, force meter with a suitable scale. • During an enquiry, they make decisions e.g. whether they need to: take repeat readings (fair testing); increase the sample size (pattern seeking); adjust the observation period and frequency (observing over time); or check further secondary sources (researching); in order to get accurate data (closer to the true value).	***Planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary*** • The children select from a range of practical resources to gather evidence to answer their questions. They carry out fair tests, recognising and controlling variables. They decide what observations or measurements to make over time and for how long. They look for patterns and relationships using a suitable sample.	**Recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs** • The children decide how to record and present evidence. They record observations e.g. using annotated photographs, videos, labelled diagrams, observational drawings, labelled scientific diagrams or writing. They record measurements e.g. using tables, tally charts, bar charts, line graphs and scatter graphs. They record classifications e.g. using tables, Venn diagrams, Carroll diagrams and classification keys. • Children present the same data in different ways in order to help with answering the question.	**Identifying scientific evidence that has been used to support or refute ideas or arguments** • Children answer their own and others' questions based on observations they have made, measurements they have taken or information they have gained from secondary sources. • They talk about how their scientific ideas change due to new evidence that they have gathered. • They talk about how new discoveries change scientific understanding. ***Reporting and presenting findings from enquiries, including conclusions*** • In their conclusions, children: identify causal relationships and patterns in the natural world from their evidence; identify results that do not fit the overall pattern; and explain their findings using their subject knowledge.	***Reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations*** • They evaluate, for example, the choice of method used, the control of variables, the precision and accuracy of measurements and the credibility of secondary sources used. • They identify any limitations that reduce the trust they have in their data.

Knowledge
How does the circulatory system work? 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. What things can impact the way the heart works? Diet, exercise, drugs and lifestyle have an impact on the way our bodies function. They can affect how well out 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. Drugs, alcohol and smoking (including vaping) have a negative effect on the body. *This content is also included in PSHE under the new statutory requirements for relationships and health education.*
Vocabulary
Circulatory system, blood vessels, oxygen, carbon dioxide, nutrients, heart, lungs, diet, deficiencies, function, drugs, alcohol

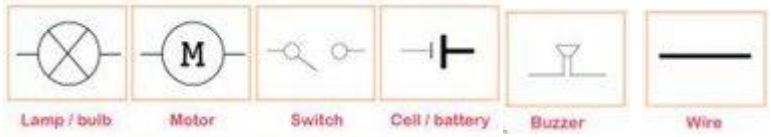
Year 6	Focus: Electricity				
Working Scientifically Skills					
Asking questions and recognising that they can be answered in different ways	Making observations and taking measurements	Engaging in practical enquiry to answer questions	Recording and presenting evidence	Answering questions and concluding	Evaluating and raising further questions and predictions
Planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary • Children independently ask scientific questions. This may be stimulated by a scientific experience or involve asking further questions based on their developed understanding following an enquiry. • Given a wide range of resources the children decide for themselves how to gather evidence to answer a scientific question. They choose a type of enquiry to carry out and justify their choice. They recognise how secondary sources can be used to answer questions that cannot be answered through practical work.	**Taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate** • The children select measuring equipment to give the most precise results e.g. ruler, tape measure or trundle wheel, force meter with a suitable scale. • During an enquiry, they make decisions e.g. whether they need to: take repeat readings (fair testing); increase the sample size (pattern seeking); adjust the observation period and frequency (observing over time); or check further secondary sources (researching); in order to get accurate data (closer to the true value).	***Planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary*** • The children select from a range of practical resources to gather evidence to answer their questions. They carry out fair tests, recognising and controlling variables. They decide what observations or measurements to make over time and for how long. They look for patterns and relationships using a suitable sample.	**Recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs** • The children decide how to record and present evidence. They record observations e.g. using annotated photographs, videos, labelled diagrams, observational drawings, labelled scientific diagrams or writing. They record measurements e.g. using tables, tally charts, bar charts, line graphs and scatter graphs. They record classifications e.g. using tables, Venn diagrams, Carroll diagrams and classification keys. • Children present the same data in different ways in order to help with answering the question.	**Identifying scientific evidence that has been used to support or refute ideas or arguments** • Children answer their own and others' questions based on observations they have made, measurements they have taken or information they have gained from secondary sources. • They talk about how their scientific ideas change due to new evidence that they have gathered. • They talk about how new discoveries change scientific understanding. ***Reporting and presenting findings from enquiries, including conclusions*** • In their conclusions, children: identify causal relationships and patterns in the natural world from their evidence; identify results that do not fit the overall pattern; and explain their findings using their subject knowledge.	***Reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations*** • They evaluate, for example, the choice of method used, the control of variables, the precision and accuracy of measurements and the credibility of secondary sources used. • They identify any limitations that reduce the trust they have in their data.

Knowledge

How do components function in an electrical circuit?

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. 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.

Recognised circuit symbols to draw simple circuit diagrams.



Vocabulary

Cell, battery, motor, buzzer, voltage