

Science



Holywell C of E Primary School

Flowing, Strengthening, Deepening

INTENT

At Holywell, we use our school vision, *Flowing, Strengthening, and Deepening*, to guide our science intent:

- **Flowing** – developing a secure understanding of key scientific knowledge and skills.
- **Strengthening** – making links between different science units using the key concepts to make these connections. For example, looking at how root hair cells in plants, and villi in the digestive system, have a similar structure related to their similar function of absorbing nutrients.
- **Deepening** – applying knowledge of science across different STEM Subjects such as DT when incorporating electrical components, or exercise science in PE, to strengthen understanding.

We use the National Curriculum as the foundation of our own science curriculum which states that:

A high-quality science education provides the foundations for understanding the world through the specific disciplines of biology, chemistry and physics. Science has changed our lives and is vital to the world's future prosperity, and all pupils should be taught essential aspects of the knowledge, methods, processes and uses of science. Through building up a body of key foundational knowledge and concepts, pupils should be encouraged to recognise the power of rational explanation and develop a sense of excitement and curiosity about natural phenomena. They should be encouraged to understand how science can be used to explain what is occurring, predict how things will behave, and analyse causes. The national curriculum for science aims to ensure that all pupils:

- *Develop scientific knowledge and conceptual understanding through the specific disciplines of biology, chemistry and physics.*
- *Develop understanding of the nature, processes and methods of science through different types of science enquiries that help them to answer scientific questions about the world around them.*
- *Are equipped with the scientific knowledge required to understand the uses and implications of science, today and for the future.*

However, our own curriculum for science goes deeper in places to reflect our children's natural curiosity and the ambition we have for them to succeed in this vital subject. For example, across units covering plants, space, the human body and electricity, for example, we cover things in greater depth than required in the curriculum because children are naturally curious about the world around them. The intent of our curriculum therefore is to provide children with the scientific knowledge and skills they need to understand the world around them, make connections between different units and apply their developing scientific knowledge across other curriculum areas.

IMPLEMENTATION

1. The Long-Term Plan

Our science curriculum covers the statutory content of the national curriculum, but goes further. We believe this is appropriate for our children and context. For example, in biology our children cover the human body and its organ systems in more depth, as well as looking at plant biology more comprehensively too to incorporate photosynthesis and the carbon cycle. Similarly, in physics, our children study space in more depth, extending their knowledge of the universe beyond our solar system. Our long term plan is as follows:

	Autumn		Spring		Summer	
EYFS	<ul style="list-style-type: none">Explore the natural world around them, making observations and drawing pictures of animals and plants.Know some similarities and differences between the natural world around them and contrasting environments, drawing on their experiences and what has been read in class.Understand some important processes and changes in the natural world around them, including the seasons and changing states of matter.					
Y1	Our Bodies	Diet and Adaptation	The Weather		Life Cycles 1 <i>Stages of Life</i>	Properties of Materials
Y2	Muscles and Bones	Habitats and Adaptation	Plants		Rocks	Solids, Liquids and Gases
Y3	The Digestive System	Forces Magnetism	The Solar System		Food Webs	Properties of Materials
Y4	The Respiratory System	Electricity <i>Simple Circuits</i>	Plants <i>Transport and Transpiration</i>		Classification	Changes of State <i>Reversible and Irreversible Changes</i>
Y5	The Cardiovascular System	Life Cycles 2 <i>Sexual and Asexual Reproduction</i>	Forces Gravity, Friction and Resistance		The Galaxy	Sound

Y6	The Nervous System	Electricity <i>Parallel Circuits</i>	Plants 3 <i>Photosynthesis</i>		Evolution	Light
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1. The Key Concepts in Science

S1: Organisation and models

Scientists have made the study of science manageable by organizing and classifying natural phenomena. For example, all living things can be organised by Kingdom, Phylum, Class, Order, Family, Genus, or objects can be arranged according to their complexity: single-celled amoeba, sponges, and so on up to mammals. Many ideas in science are complex, therefore we create simplified models to represent them. The traditional representation of an atom, may not be accurate, but it is a useful way of conceptualising the relationship between electrons, protons, neutrons and other sub-atomic particles.

S2: Systems and Cycles.

A system is a whole that is composed of parts arranged in an orderly manner according to some scheme or plan. In science, systems involve matter, energy, and information that move through defined pathways. The amount of matter, energy, and information, and the rate at which they are transferred through the pathways, varies over time. Children begin to understand systems by tracking changes among the individual parts. Systems can be biological, such as the respiratory and circulatory systems, or physical, such as an electrical circuit.

S3: Structure and Function

A relationship exists between the way organisms and objects look (feel, smell, sound, and taste) and the things they do. Carnivores have sharp teeth to help them hunt, and the bi-concave structure of a red blood cell helps it fit through narrow capillaries and increases its surface area to transport more oxygen.

S4: Cause and Effect

Nature behaves in predictable ways. Searching for explanations is the major activity of science; effects cannot occur without causes. We can learn about cause and effect by observing the effect that light, water, and warmth have on seeds and plants, or the effect of applying heat to water.

S5: Variation and Diversity

All organisms and objects have distinctive properties. Some of these properties are so distinctive that no continuum connects them – for example, living and non-living things, or sugar and salt. In most of the natural world, however, the properties of organisms and objects vary continuously. Diversity is the most obvious characteristic of the natural world; there are many types of objects and organisms. Diversity in nature is essential for natural systems to survive. For example, diversity in an ecosystem helps protect against the consequences of a single species die out.

3. Unit Overviews

Year 1

Our Bodies (Autumn 1)	
LOs and Key Concepts	
1	To understand that humans are a species of great ape (hominid) and the similarities we share with them and other mammals (S1).
2	To name the key internal and external parts of the human body (S2).
3	To understand the main function of our major organs (S2).
4	To understand how the structure of different parts of the body are related to their function (S3).
5	To understand how to keep our bodies healthy (S4).
6	To understand and appreciate the diversity of the human race (S5).
Key Outcomes	
The children will learn that as humans we are a species of great ape alongside orang-utans, gorillas and chimpanzees, and that we share many similarities to these other animals as well as mammals generally. They will be able to identify and locate key internal and external parts of the human body and understand the functions of our major organs. They will understand how different parts of the human body's structure relates to its function, for example, learning that bones are hard so they can protect and support us. The children will learn the different ways of keeping our bodies healthy, through appropriate nutrition, hygiene and regular exercise, and will appreciate that our bodies can look very different, but that they all do the same thing and we are all humans.	
Vocabulary	
Hominid, Great Ape, Mammal, Brain, Lungs, Heart, Stomach, Bladder, Intestines, cranium, mandible, Spine, Rib Cage, Sternum, clavicle, scapula, humours, radius, ulna, carpals, meta carpals, phalanges, pelvis, femur, tibia, fibula, patella, tarsals, metatarsals, phalanges, eyes, nose, mouth, ears, neck, hair, chest, stomach, arms, legs, fingers, toes, penis, testicles / testes, vulva, vagina	

Food and Adaptation (Autumn 2)	
LOs and Key Concepts	
1	To identify and sort animals as herbivores, carnivores and omnivores (S1).
2	To identify food as a source of energy and construct simple food chains with a predator (carnivore), prey (herbivore) and producer (vegetation) for aquatic and land animals (S2).
3	To understand some of the ways carnivores are adapted to hunt and eat prey (S3).
4	To understand some of the ways herbivores are adapted to graze on vegetation (S3).
5	To understand that humans as animals are herbivores and get our energy from food (S5).
6	To understand the principles of a healthy diet, recognising the main food groups and the benefits they provide (S3).
Key Outcomes	
The children will understand the three broad categories of diet: carnivore, omnivore and herbivore, and that animals, including humans, get our energy from food. They will construct a variety of simple food chains to explain this energy transference. They will learn some of the ways in which different types of animals are adapted to hunt and eat their prey. For example, carnivores tend to have powerful muscle for speed to hunt, as well as excellent senses for tracking and locating, as well as sharp teeth and powerful claws for killing prey. They will understand the different types of nutrients that we get from different food groups and the principles of a healthy diet.	
Vocabulary	
Carnivore, herbivore, omnivore, diet, adaptation, predator, prey, vegetation, food, energy, food chain	

Earth and Space 1 (Spring)	
LOs and Key Concepts	
1	To understand that the Earth is constantly rotating on an axis and that this causes day and night (S4).
2	To understand that the Earth orbits the sun at an angle, and this causes the different seasons (S4).
3	To understand what the weather is like during Autumn and why (S4).
4	To understand what the weather is like during Winter and why (S4).
5	To understand what the weather is like during Spring and why (S4).
6	To understand what the weather is like during Summer and why (S4).
Key Outcomes	
The children will learn that the Earth is split into two hemispheres, Northern and Southern, and that it rotates on an axis. They will use this to understand how day changes to night. Following this, they will understand that the Earth orbits the sun with a slight tilt, and why this means that we get different seasons. They will then move through the seasons one by one, learning what the weather is like during each one. The children will sketch diagrams to show the night and day, and the seasons and use practical equipment such as rainfall measurements and thermometers to track the weather as the year progresses.	
Vocabulary	
Earth, Sun, Rotates, Axis, Orbits, Tilt, Hemisphere, Northern Hemisphere, Southern Hemisphere, Angle, Winter, Spring, Summer, Autumn, Temperature, Rainfall	

Life Cycles - (Summer 1)	
LOs and Key Concepts	
1	To sort animals as mammals, reptiles, amphibians, birds and fish by their characteristics (S1).
2	To identify the key stages in the life of humans as we grow up, and identify some of the ways we change (S2).
3	To explore the key stages in the life of other mammals and compare these to humans (S2/S5).
4	To identify the key stages in the life of birds and compare these to the life cycle of other animals (S2/S5).
5	To identify key stages in the life of amphibians and compare these to the life cycle of other animals (S2/S5).
6	To identify key stages in the life of reptiles, and compare these to the life cycle of other animals (S2/S5).
Key Outcomes	
The children will learn that animals are grouped together based on the characteristics and will use this knowledge to sort animals as amphibians, reptiles, birds, fish of mammals. The children will then explore the human life cycle and explore some of the changes that take place in an age-appropriate way, such as getting much taller and stronger. They will then look at the life cycles of other mammals, and explore similarities and differences, such as, for example, the fact that many other mammals can walk soon after birth. They will then explore the life cycles of example animals from each group, and relate them to the life cycles of other types of animals to identify similarities and differences.	
Vocabulary	
amphibian, reptile, mammal, fish, bird, baby, toddler, child, teenager, adolescent, adult, development, gestation, life cycle, egg, live young, larva (larvae), chick,	

Materials (Summer 2)	
LOs and Key Concepts	
1	To identify and name and variety of everyday materials (S1).
2	To find out how the shapes of some solid objects can be changed by bending, twisting and squishing (S4).
3	To identify the different materials that everyday objects are made from (S1/S3).
4	To describe the properties of a variety of everyday materials (S3).
5	To identify the suitability of a material to the function of the object it is made from (S1/S3).
6	To compare how objects made from different materials move on different surfaces (S4).
Key Outcomes	
The children will identify the basic materials from which the vast majority of objects are constructed from, and identify their properties and characteristics. They will think about why some materials are useful for certain functions, such as that windows are made from glass because they are solid, won't melt in the hot sun and are see through. They will then think about how some more complex objects are made from a huge number of individual components made of different materials. They will learn that some of the everyday materials occur naturally, and some are artificial or manmade. They will then think about how the shapes of objects can be changed, as well as observing how objects made from different materials move differently across surfaces.	
Vocabulary	
wood, plastic, glass, metal, water, transparent, opaque, translucent, hard, flexible, rough, smooth, absorbent, brittle, shiny, waterproof, strong, insulating, conducting	

Year 2

Muscles and Bones (Autumn 1)	
LOs and Key Concepts	
1	To understand that the muscular-skeletal system helps support us, allows us to move, and protects other organ systems (S1/S2).
2	To identify the key bones of the human skeleton and their function (S2/S3).
3	To identify the key muscles of the human body and their function (S2/S3).
4	To understand how muscles work in pairs to help us move our bones (S4).
5	To understand that different types of animals have different types of skeletons, or no skeleton at all, and group them accordingly (S1/S5).
6	To understand how different foods are important for muscles, bones, growth and movement (S4).
Key Outcomes	
The children will understand that muscles and bones form the muscular-skeletal system which functions to help us stand and move, as well as protecting our vital organ systems. They will be able to identify key bones of the human skeleton and their function, as well as key muscles and their function. They will understand how muscles and bones work together with tendons and ligaments to help us move. They understand the difference between animals with endoskeletons, exoskeletons and hydrostatic animals, and be able to sort them into these different categories. The children will learn that different types of food we eat provide different nutrients that help keep our muscular-skeletal system functioning. For example, identifying how eating meat provides protein, which helps our muscles grow.	
Vocabulary	
Muscle, bones, ligament, joints, tendons, exoskeleton, endoskeleton, hydrostatic skeleton, muscular-skeletal system.	

Habitats and Adaptation (Autumn 2)	
LOs and Key Concepts	
1	To identify the Earth's major habitats: forest, desert, polar/tundra, grassland and aquatic (S1/S5).
2	To identify some of the ways forest animals are adapted to live in their habitat (S3/S5).
3	To identify some of the ways desert animals are adapted to live in their habitat (S3/S5).
4	To identify some of the ways polar animals are adapted to live in their habitat (S3/S5).
5	To identify some of the ways grassland animals are adapted to live in their habitat (S3/S5).
6	To identify some of the ways aquatic animals are adapted to live in water (S3/S5).
Key Outcomes	
The children will learn the key habitats of Earth: forest, desert, polar/tundra, grassland and aquatic as well as prominent examples of each and their location, for example, the Amazon and Congo Rainforests, or the Arabian Desert. They will identify commonly known animals that inhabit each of these environments and ways in which they are adapted to do so. For example they might learn how animals commonly have the colouring of their environment for camouflage, or how thick fur might keep them warm, or how their wide paws, or light weight might prevent them from sinking in the snow.	
Vocabulary	
Earth, Equator, Forest, Rainforest, Desert, Polar Regions, Tundra, Grassland, Aquatic, Oceanic, Habitat, Adaptation, Camouflage.	

Plants 1 (Spring)	
LOs and Key Concepts	
1	To describe the basic structure of a flowering plant: roots, stem, leaves and flower (S3).
2	To understand how the structure of different parts of a plant are linked to their function (S3).
3	To understand the things plants need to grow, and the effect of having too much or too little (S4).
4	To describe the life cycle of a plant from seed to mature plant (S2).
5	To understand how plants in different habitats are adapted to survive in them (S5).
6	To identify and name a variety of common plants and trees (S1).
Key Outcomes	
The children will identify the basic structure shared by plants and trees: root system, stem, leaves and flowers and their different function. They will learn how their physical structure (size and shape) are related to their role, such as that leaves are flat and wide to collect sunlight, and that roots are long and narrow to dig into soil as an anchor. They will learn the things that plants need to grow, as well as what can happen when they get too much, or too little of them. They will create experiments to test this by planting plants in different conditions. They will learn to describe the life cycle of a flowering plant as it germinates from a seed, grows to a mature plant which produces more seeds, in a repeating cycle. They will learn that plants in different habitats are adapted to their environments, such as that cacti need far less water, relating this to their understanding of how animals are also adapted to their habitats. Lastly, they will identify a variety of common plants and trees and make observational drawings of their favourite ones.	
Vocabulary	
Plant, tree, flower, root, stem, leaves, flower, trunk, branch, sunlight, nutrients, soil, water, seed, germinate, seedling, sapling, habitat, conditions	

Rocks - (Summer 1)	
LOs and Key Concepts	
1	To identify the different types of rocks and their properties (S1).
2	To sort and group different rocks based on their appearance and simple physical properties (S1).
3	To identify and name the different layers of soil and representing them physically and visually (S3).
4	To set up a practical experiment to test the permeability of different types of soils (S3/S4).
5	Describe in simple terms how fossils are formed when living things become trapped within rock (S4).
Key Outcomes	
The children will learn about the three main types of rocks, sedimentary, igneous and metamorphic, and explain how they are formed. They will use this knowledge, and their knowledge about their properties of them, to sort and group rocks into each category. They will then learn the basics of how fossils are formed when living animals become trapped in rocks. They will then move onto learning about the different layers of soil, representing this both physically and visually, before going on to set up an experiment to test the permeability of different types of soil to water.	
Vocabulary	
Sedimentary, metamorphic, igneous, rock, soil, sand, appearance, texture, permeable, impermeable, sand, gravel, clay, chalk, flint, granite, sandstone, volcano, soft, rough, smooth	

Matter - (Summer 2)	
LOs and Key Concepts	
1	To explain the difference between a solid, liquid and gas, and identify them in our everyday lives (S1).
2	To explain the particle arrangement of a solid, liquid and a gas (S3).
3	To explore that some materials change state when they are heated or cooled (S4).
4	To set up an experiment to test the temperature at which different substances start to melt (S4).
5	To explore the concept of thermal insulators and conductors and identify everyday examples (S4).
6	To set up an experiment to test which materials will keep ice cream frozen the longest (S4).
Key Outcomes	
The children will learn the difference between a solid, a liquid and a gas, and identify them in our everyday lives (drinks, food, tables, deodorant etc.). They will be introduced to the idea that everything is made up of little building blocks called particles and explore how they are arranged in solids, liquids and gases. They will then learn that solids, liquids and gases can often change state when they are heated or cooled, and that different substances will change state at different temperatures. They will set up a simple experiment to test this idea. They will then be introduced to the idea of insulators and conductors, and will set up an experiment to test which materials keep ice cream frozen the longest.	
Vocabulary	
solid, liquid, gas, particle, arrangement, change of state, heat, cool, thermal, insulator, conductor, melting point, boiling point	

Year 3

The Digestive System (Autumn 1)	
LOs and Key Concepts	
1	To understand how the body is organised into different systems that work together for a common purpose (S1/S2).
2	To understand the different organs involved in the digestive system, and to understand that all mammals despite their variation have a similar digestive system (S2/S5).
3	To understand the cause and effect chains of the digestive system (practical) (S4).
4	To understand the cause and effect chains of the digestive system (visual model) (S4).
5	To understand how the structure of different teeth reflects their function (S3).
6	To understand how the structure of the intestines and villi reflect and support their function (S3).
Key Outcomes	
The children will be able to identify the key organ systems of the body, and what they work together to enable us to do. They will identify that all mammals, despite being very different, have similar organ systems. They will identify the key organs of the digestive system, and look at the cause and effect chains that enable food to be digested, right from chewing, all the way through to nutrient absorption in the intestines. They will understand how the shape of teeth reflect their different roles in the mastication process, and how the structure of the intestines and the intestinal villi increase the surface area available for nutrient absorption.	
Vocabulary	
Mouth, Teeth, Salivary Gland, Enzyme, Mastication, Chemical Digestion, Mechanical Digestion, Oesophagus, Stomach, Bladder, Small Intestine, Large Intestine, Villi Rectum, Anus, Excretion, Faeces, Absorption, Amino Acid, Protein, Carbohydrate, Fibre, Nutrients, Lipids, Gall Bladder, Pancreas, Liver, Hydrochloric Acid	

Forces and Magnets (Autumn 2)	
LOs and Key Concepts	
1	To identify 'push' and 'pull' forces (S1/S4).
2	To explore how different objects move on different surfaces.
3	To understand that magnets can act at a distance, and describe magnets as having two poles, using this predict if two will attract or repel each other (S3/S4).
4	Investigate and group together everyday materials as magnetic or not, based on whether or not they are attracted to a magnet (S3/S4).
5	To investigate the strength of different magnets and see if it is related to their size (S3/S4).
6	To identify some of the uses of magnets in everyday life (S3/S4).
Key Outcomes	
The children will understand that objects move because they are physically pushed or pulled and that these push or pull actions are called forces. They will identify how objects move on different surfaces and that rougher surfaces slow movement down due to friction. They will understand magnetism as a force doesn't require physical contact, and that magnets have two poles, north and south. They will use this to predict whether or not two magnets will attract or repel each other. They will use magnets to test everyday objects for their magnetism, before going to test whether or not all, or just some, metals are magnetic. They will investigate if the strength of a magnet is related to its size, as well as the application of magnets in a day-to-day life.	
Vocabulary	
Magnet, Magnetic, Attract, Repel, Magnetic Poles, North, South, Force, Push, Pull, Surface, Friction, Resistance	

Earth and Space (Spring)	
LOs and Key Concepts	
1	To identify the structure of the solar system and the names of the planets (S2).
2	To identify the different types of planets and their structure (S2).
3	To understand that planets orbit the sun due to gravity (S2).
4	To understand the different phases of the moon as it orbits the Earth (S4).
5	To understand that the sun is at the centre of the solar system, but that this wasn't always believed to be true (S1).
6	To understand that our Solar System is one of many that make up a Galaxy, and that there are many galaxies in the universe (S1).
Key Outcomes	
The children will learn the structure of the solar system, including the key bodies: Sun, Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus and Neptune, as well the location of the asteroid belt and Oort Cloud. They will learn about the different types of planets: terrestrial planets, gas giants, ice giants and dwarf planets. They will learn how the planets orbit the sun on stable paths due to the Sun's gravitational pull, and that the fact that the sun is at the centre of the universe wasn't always known and was considered deeply controversial. They will then begin to understand that the Solar System is one of many that make up our galaxy, and that our galaxy is one of many billions that exist in the universe.	
Vocabulary	
Sun, Star, Mercury, Venus, Earth, Mars, Terrestrial Planet, Jupiter, Saturn, Gas Giant, Uranus, Neptune, Ice Giant, Pluto, Dwarf Planet, Asteroid Belt, Oort Belt, Heliosphere, Heliocentric, Geocentric, Orbit, Path, Axis, Solar System, Galaxy, Universe	

Food Webs (Summer 1)	
LOs and Key Concepts	
1	To understand that plants produce energy from the sun, and this is a unique ability (S4).
2	To understand that all animals get energy from food, and that energy is lost as it is transferred (S2).
3	To explain that each level of the food chain pyramid is dependent on the others and creates an ecosystem (S4).
4	To identify and represent the food webs of an arctic habitat (S1).
5	To identify and represent the food webs of an ocean habitat (S1).
6	To identify and represent the food webs of a forest habitat (S1).
Key Outcomes	
The children will identify the sun as the ultimate source of all energy on earth, and will identify plants as producers with a unique ability to harness the sun's energy to produce food. They will learn that herbivores get energy from eating plants and vegetation, and carnivores get energy from eating herbivores. They will learn that energy is lost as it is transferred up the food chain, and this explains why producers and herbivores are more numerous than large carnivores. They will use this knowledge to identify that all living things are interdependent and that if levels of the food chain were to deplete or disappear, there would be significant known on consequence higher up. They will then learn about and represent food webs of a variety of different ecosystems and habitats, ultimately identifying that all of the interdependent vegetation and animals within a habitat make an ecosystem.	
Vocabulary	
habitat, ecosystem, region, polar, arctic, tundra, desert, forest, temperate forest, tropical forest, mountain zones, energy, producer, photosynthesis, energy, transference, food chain, food web, herbivore, carnivore, interdependence	

Materials (Summer 2)	
LOs and Key Concepts	
1	To recap a range of everyday materials and their properties.
2	To recap how the properties of materials are related to their function.
3	To describe a wider range of the properties of materials such as durability, magnetism and transparency, and suggest why these properties make different materials suitable for different jobs.
4	To identify thermal conductivity and identify the best thermal conductors and insulators.
5	To identify electrical conductivity, and identify the best electrical conductors and insulators.
6	To look at a range of household objects and explain the materials they are made from based on their knowledge of thermal or electrical conductivity.
Key Outcomes	
The children will recap key learning from Year 1 by looking at everyday materials and their properties and how their properties are related to the things we make from them. They will then look at describing materials based on a wider range of properties such as transparency, durability and flexibility and how these properties make certain materials suited to different uses. They will then look at the concept of thermal and electrical conductivity, identifying materials as thermal or electrical conductors or insulators, before looking for these in a range of household applications.	
Vocabulary	
wood, plastic, glass, metal, water, transparent, opaque, translucent, hard, flexible, rough, smooth, absorbent, brittle, shiny, waterproof, strong, insulating, conducting, conductor, insulator, efficiency	

Year 4

The Respiratory System (Autumn 1)	
LOs and Key Concepts	
1	To identify the different organs that make up the respiratory system, and to understand that different mammals, despite their variation, have a similar system (S1/S2/S5).
2	To identify how the different parts of the respiratory system work together to help us breathe and the cause and effect chains involved (practical) (S4).
3	To identify how the different parts of the respiratory system work together to help us breathe and the cause and effect chains involved (visual model) (S4).
4	To identify how gaseous exchange works in the alveoli (S3/S4).
5	To understand how the structure of the lungs increase their surface area for gaseous exchange (S3).
6	To measure and record breathing rate during exercise, and to measure and record lung capacity (practical) (S2).
Key Outcomes	
The children will identify that all mammals, despite being very different, have similar respiratory systems. They will identify the key organs of the respiratory system, and look at the cause and effect chains that enable us to breathe through muscle contraction and relaxation. They will understand the 'journey' of oxygen once it enters the body through the nose and mouth, and how oxygen enters blood through gaseous exchange in the alveoli, at which point the respiratory system takes over. They will understand how the structure of the lungs increases the surface area available for gaseous exchange. They will use practical equipment to measure lung capacity, as well as look at how exercise affects breathing rate.	
Vocabulary	
Nose, Mouth, Pharynx, Epiglottis, Trachea, Larynx, Intercostal Muscles, Ribs, Lungs, Bronchus, Bronchiole, Alveoli, Diaphragm, Gaseous Exchange, Oxygen, Carbon Dioxide, Respiration, Inspiration, Expiration, Pulmonary Ventilation, Tidal Volume,	

Electricity 1 (Autumn 2)	
LOs and Key Concepts	
1	To identify a variety of appliances that run on electricity (S1).
2	To construct simple series electrical circuits using a variety of components (S2).
3	To represent a variety of simple series electrical circuits visually using recognised symbols (S1/S2).
4	To predict whether or not a series circuit will work by identifying if it is a closed loop, and has the required components (S2).
5	To use switches in a simple series circuit, and understand how they work to stop the flow of electricity (S2).
6	To understand that some materials conduct electricity and investigate conductivity, grouping them accordingly (S4).
Key Outcomes	
The children will learn how to construct simple series electrical circuits using a variety of components, understanding that they have to be a complete loop to function. They will learn how to represent these visually using recognised symbols, and predict whether or not a series circuit will work by deciding if it is a complete closed loop with necessary components. They will understand how switches work and incorporate them into the circuits they build. They will understand that some materials conduct electricity, and some are insulators, conducting investigations to group and sort them appropriately.	
Vocabulary	
Appliance, Device, Series Circuit, Cell, Battery, Wires, Crocodile Clips, Bulb, Bulb Holder, Buzzer, Motor, Switch, Conductor, Insulator	

Plants 2 (Spring)	
LOs and Key Concepts	
1	To understand the structure of a plant's flower and how it relates to its function (S3).
2	To understand the stages in the pollination of a flower and the important role of bees (S2).
3	To understand that water enters the plant through its roots (S4).
4	To understand how water is transported around the plant through the xylem and phloem (S4).
5	To understand that water leaves the plant through its leaves in a process known as transpiration (S4).
6	To understand the role plants play in storing water and flood prevention (S2).
Key Outcomes	
The children will understand the structure of a plant's flower and how its structure is related to its function. For example, how its brightly coloured leaves are designed to attract bees. They will understand the process of pollination and the crucial role that bees play in moving nectar from one plant to another. Following this, the children will deepen their understanding of a plant's root structure, and how they are designed to help water uptake. They will compare the root structure to those of the villi in the human digestive system, which are similarly structured for their role. They will learn how water is transplanted through the plant via xylem and phloem in the stem and leaves, setting up practical demonstrations to show this. The children will then learn how water leaves the plant via the roots in a process called transpiration, and the part that this process plays in the water cycle. Finally, the children will learn of the important role that plants play in storing water and flood prevention.	
Vocabulary	
Stamen (anther, filament), pistil (stigma, style, ovary), petal, sepal, pollination, fertilisation, xylem, phloem, minerals, nutrients, uptake, root hair, osmosis, flood prevention.	

Classifications (Summer 1)	
LOs and Key Concepts	
1	To explore the history of classification and the Linnaean System.
2	To explore how animals can be divided into different groups according to common characteristics.
3	To explore how plants can be divided into different groups according to common characteristics.
4	To explore how micro-organisms can be divided into different groups according to common characteristics.
5	To generate and use classification keys to group animals, plants and micro-organisms together.
6	To identify and classify animals in the local environment.
Key Outcomes	
<p>The children will learn about the 18th century scientist Carolus Linnaeus who introduced a formalized system of naming organisms (taxonomic nomenclature) by dividing the natural world into 3 kingdoms of five ranks and introducing the system of binomial nomenclature, in which every species has an internationally recognized two-part name. Other ranks have been added to the taxonomic nomenclature system to inform the system we use today: Kingdom, Phylum, Class, Order, Family, Genus, and Species.</p> <p>The children will then explore the classification of the three main kingdoms - plants, animals and micro-organisms - in more detail based on the observable characteristics of each. They will then devise their own classification keys using this system, before looking at the wildlife in the local environment and identifying and classifying them.</p>	
Vocabulary	
Characteristics, Classify, Taxonomist, Key, Domain, Kingdom, Phylum, Class, Order, Family, Genus, Species.	

Matter 2 (Summer 2)	
LOs and Key Concepts	
1	To recap the different particle arrangements of a solid, liquid and gas and identify how states of matter can be changed by heating or cooling.
2	To identify common changes of state and describe them as either reversible or irreversible.
3	To know that some materials will dissolve in liquid to form a solution, and describe how to recover a substance from a solution
4	Demonstrate that dissolving, mixing and changes of state are reversible changes
5	Use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating
6	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.
Key Outcomes	
<p>The children will recap learning for states of matter in Year 2, looking at the particle arrangements of a solid, liquid and gas and identify how cooling and heating can cause a material or substance to change state. The children will then look at common changes of state, such as cooking, and identify them as either reversible changes or irreversible changes. The children will then look at how some substances (solute) can dissolve in a liquid (solvent) to form a solution, and that this can be reversed and the solute recovered using evaporation. The children might dissolve sugar or salt in water, then recover the sugar or salt by heating the water, leaving the original solute behind. Alternatively, they will learn that some materials do not dissolve in water, such as sand, and can be recovered by filtering where the larger sand particles are caught in a sieve. They will summarise that changes of state, dissolving and mixing are reversible changes. The children will then use their knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating by creating a 'potion' and working out how to separate it into its original components. They will finish the units by looking at how some changes result in the formation of new materials, and that these changes, particularly burning, and the use of acids, results in irreversible changes.</p>	
Vocabulary	
Solid, Liquid, Gas, Change of State, Heating, Cooling, Dissolving, Mixing, Solute, Solvent, Solution, Separating, Acid, Burning, Bicarbonate of Soda, Carbon	

Year 5

The Cardiovascular System (Autumn 1)	
LOs and Key Concepts	
1	To identify the different organs that make up the cardiovascular system, and to understand that different mammals, despite their variation, have a similar system (S1/S2/S5).
2	To understand the cause and effect chains that enable the different parts of the circulatory system to circulate oxygen round the body (practical) (S4).
3	To understand the cause and effect chains that enable the different parts of the circulatory system to circulate oxygen round the body (visual model) (S4).
4	To understand how the structure of the heart supports its function (S3).
5	To understand the different components of blood, and how their structure supports their different function (S3).
6	To investigate how exercise affects heart rate (practical) (S2).
Key Outcomes	
The children will identify that all mammals, despite being very different, have similar circulatory systems. They will identify the key organs of the circulatory system, and look at the cause and effect chains that enable them to circulate oxygen round the body through blood. They will understand how the heart works to pump blood, as well as how its structure supports its function. They will look at the different components of blood, and how their structure reflect their different functions, such as how the shape of the red blood cells increase their surface area to transport oxygen. They will identify the where the respiratory system ends and the circulatory system takes over. They will use practical equipment to measure the effect of exercise on heart rate.	
Vocabulary	
Heart, Chambers, Atrium, Ventricle, Pulmonary, Vena Cava, Lungs, Vessels, Veins, Arteries, Capillaries, Blood, Heart Rate, Oxygen, Carbon Dioxide, Cells, Platelets, Plasma, Heart Rate, Pulse, Organs, Transport, Circulation.	

Life Cycles (Autumn 2)	
LOs and Key Concepts	
1	To understand and explain sexual reproduction in plants (S2/S3).
2	To understand and explain asexual reproduction in plants (S2/S3).
3	To propagate new plants by taking cuttings and replanting them (S4).
4	To understand and explain sexual reproduction in animals, and describe it as the way in which most animals reproduce (S2/S3/S5).
5	To describe the changes that humans go through as we develop from childhood and into old age (S2).
6	To describe the difference in the life cycles of a mammal, an amphibian, a bird and an insect (S5).
Key Outcomes	
The children will understand that plants reproduce in one of two ways: sexual and asexual and describe how these two methods happen. They will use plant clippings to grow new specimens, and understand how important insects like bees are to the process of sexual reproduction in plants. They will understand that most animals reproduce by sexual reproduction and how this works. They will then look at the different stages a human goes through as we develop from infancy, through puberty and into old age, and identify the main differences between the life cycles of a mammal, an amphibian, a bird and an insect.	
Vocabulary	
Sexual, Asexual, Fertilisation, Egg, Ovary, Sperm, Pollination, Gametes, Zygote, Genes, Clone	

Forces (Spring)	
LOs and Key Concepts	
1	To understand that objects fall to Earth due to gravity and attribute this discovery to Isaac Newton.
2	To understand friction, and investigate the effect of different surfaces on the movement of an object.
3	To understand the force of air resistance, and investigate its effect on slowing, and speeding up, falling objects.
4	To understand the principles of aerodynamics, investigating how the shape of an objects offsets resistance.
5	To understand the force of water resistance, and investigate its effect.
6	To understand how water resistance is offset using similar principles to aerodynamics and applying them to hulls.
Key Outcomes	
The children will identify that like magnetism, gravity is a force that does not require physical touch to work. They will explore the concept of gravity, and learn how the gravitational pull of the sun keeps the planets of the solar system in place. They will then move on to understanding friction, and investigate the movement of different objects on different surfaces, measuring the impact of each in newton metres. They will then explore the forces of air and water resistance, and look at how the principles of aerodynamics is applied to aircraft and ship design to offset the resistance and allow them to move more effectively. They will learn that when forces are balanced, there is no motion, and that motion is a consequence of forces being unbalanced.	
Vocabulary	
Gravity, newtons, newton meter, friction, resistance, water resistance, aerodynamics, balance, force, motion.	

Sound (Summer 1)	
LOs and Key Concepts	
1	To understand how sounds are created (S4).
2	To recognise that sound travels through a medium to our ear, and explore the impact of the medium on sound quality and volume (S4).
3	To understand the simple anatomy of the human ear, and how the ear, nerves and the brain work together to enable us to hear (S1/S2).
4	To investigate patterns between the pitch of a sound and features of the object that produced it (S4).
5	To investigate patterns between the volume of a sound and the strength of the vibrations that produced it (S4).
6	To investigate the relationship between volume and distance (S4).
Key Outcomes	
The children will learn the simple physics behind the creation of sound through vibration and how sound travels in waves, including round corners. They will learn that sound travels through a medium such as air or water, and explore the impact of the viscosity of the medium on sound quality and volume. They will then look at the basic anatomy of the human ear, and discover how it works together with the nerves and brain to help us hear sound. Following this, they will begin to explore the relationship between pitch and the features of the object that produced it; volume and the strength of vibrations and the relationship between distance and volume.	
Vocabulary	
Sound, wave, vibrate, pitch, volume, medium, air, water, viscous, acoustics, ear, eardrum, hammer, anvil, cochlea, cochlea nerve, auditory canal, Eustachian tube	

Earth and Space (Summer 2)	
LOs and Key Concepts	
1	To identify and classify different types of stars based on their properties (S1).
2	To understand the different stages in the life cycle of a star (S2).
3	To understand how black holes are formed and where they are often found (S4).
4	To understand the principles of the Big Bang Theory and the creation of the universe (S4).
5	To look at the work of the Hubble Space Telescope and identify some of the things it has photographed (S1).
6	To understand the principles of and different stages in space flight (S4).
Key Outcomes	
The children will begin to expand their knowledge of space beyond our solar system. They will look at the different types of stars that exist, and their relative sizes and scales compared to our Sun. They will then look at key stages in the life cycle of a star, before looking at the formation of black holes and locating them at the centre of most galaxies. They will then go onto look at the Hubble Space telescope and identify some of the other major celestial bodies it has photographed over time, such as the different nebulae and galaxies. They will end by look at the principles of space flight, and identify how we manage to get astronauts to and from the ISS and the moon.	
Vocabulary	
Star, Sun, supergiant, neutron, red dwarf, white dwarf, red giant, main sequence star, tauri star, protostar, nebula, plasma, nuclear fusion, hydrogen, super nova, black hole, supermassive black hole, galaxy, big bang, Hubble Space telescope, ISS, Apollo missions	

Year 6

The Nervous System (Autumn 1)	
LOs and Key Concepts	
1	To identify the different parts of the nervous system and that such a system is common to all mammals and animals more generally (S1/S2/S5).
2	To identify key parts of the human brain and relate them to their function (S2).
3	To identify different receptors or sense organs, and the stimuli they respond to (S2).
4	To understand how the structure of different aspects of the nervous system support their function (S3).
5	To understand the cause and effect chains that enable <i>mechanical</i> reflex reactions to take place (moving hand away from a hot object) (S4).
6	To understand the cause and effect chains that enable <i>chemical</i> reflex reactions to take place (salivating in response to food) (S5).
Key Outcomes	
The children will identify different parts of the nervous system and their function, and that together they work to effect mechanical or chemical reactions that control our bodies. They will understand that all mammals have a similar system. They will identify the brain's central role in our nervous system, identifying the different parts and what they control. They will also identify different receptors (sense organs) in our bodies, and the varying stimuli they respond to. They will learn about the different cause and effect chains that create both mechanical and chemical responses in our bodies, such as what happens to make our hand move away reflexively from a hot object, or what happens to make us salivate when we smell delicious food. They will also understand how the structure of different aspects of the central nervous relate to their function, such as why neurones are long and thin, and why the brain is so dense.	
Vocabulary	
Nervous System, Central Nervous System, Brain, Spinal Cord, Peripheral Nervous System, Nerve Cell, Neurones, Receptor, Sense Organ, Sensory Neurone, Motor Neurone, Synapse, Neurotransmitter, Effector, Muscles, Glands, Hormone, Enzyme, Skin, Tongue, Nose, Eye, Ear	

Electricity 2 (Autumn 2)	
LOs and Key Concepts	
1	To identify the effects of adding additional components to a series circuit (S3).
2	To construct a variety of parallel electrical circuits and identify the difference to a series circuit (S2).
3	To represent a variety of parallel electrical circuits visually using recognised symbols (S1).
4	To predict whether or not a parallel circuit will work and identify errors in their construction (S2/S4).
5	To understand how power stations work and how electricity is distributed around the country (S2).
6	To understand the difference between renewable and non-renewable energy and the prevalence of each in the UK (S2).
Key Outcomes	
The children will revisit series electrical circuits and investigate the effect of increasing the number of components without increasing the number of cells on, for example, bulb brightness or buzzer volume, and vice versa. They will then move onto looking at parallel circuits, building a variety of them and representing those using recognised symbols. They will use their knowledge of parallel circuits to identify errors that will prevent them working correctly. They will then move onto looking at different ways electricity is generated in the UK, the prevalence of different types of generation, and how electricity is distributed nationally via the national grid.	
Vocabulary	
Series circuit, parallel circuit, volt, dimness, brightness, volume, power station, turbine, generator, transformer, renewable, non-renewable, fossil fuels, carbon, global warming, sustainable, sustainability, power lines, reactor, nuclear, wind, solar, hydro power, tidal power.	

Plants 3 (Spring)	
LOs and Key Concepts	
1	To understand the basic structure of a leaf and how its structure supports its function.
2	To understand the basic principles of photosynthesis and the importance of this process to life.
3	To explain the different stages in the carbon cycle and the important role played by trees.
4	To understand how human activity is leading to more atmospheric carbon.
5	To understand the role of trees in sequestering atmospheric carbon.
6	To explore how increased carbon and other greenhouse gases is increasing the temperature of the planet and the consequences of this.
Key Outcomes	
The children will learn the basic structure of a leaf and explain how its features such as a large surface area support it to fulfil its role effectively. The children will learn the basic principles behinds photosynthesis, including that plants are important for removing atmospheric carbon and replacing it with the air we breathe. They will understand the different parts of the carbon cycle, and the important role plants and trees play in sequestering atmospheric carbon and storing it, as well as looking at how human activity is increasing the levels of carbon, leading to global warming.	
Vocabulary	
Leaf, stoma, guard cells, cuticle, upper epidermis, mesophyll cells, chloroplasts, chlorophyll, epidermis, photosynthesis, osmosis, respiration, transpiration, carbon dioxide, sunlight, water, glucose, oxygen, carbon cycle, atmosphere, carbon store, carbon emissions, sequestering, climate change, global warming, greenhouse effect	

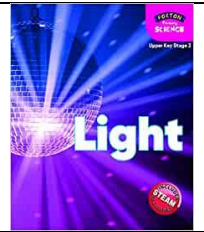
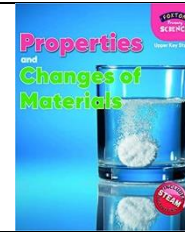
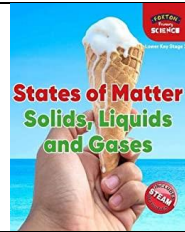
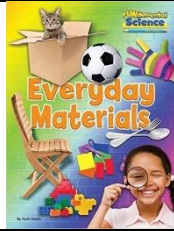
Evolution and Inheritance (Summer 1)	
LOs and Key Concepts	
1	To introduce the concept of evolution through Darwin's work on the Theory of Natural Selection (S4).
2	To explore why Darwin's work was controversial at the time of his writing (S1).
3	To identify the ways in which humans have evolved over time (S4).
4	To explore examples of how different animals have adapted to their environment and habitat (S3/S4).
5	To identify that fossils give us information on animal life from millions of years ago (S4).
6	To identify that we receive 50% of our genetic material from each parents, resulting in inherited characteristics (S4/S5).
Key Outcomes	
The children will be introduced to the work of Darwin and his Theory of Natural selection which resulted from his observations on the Galapagos Islands. They will explore how he came to his conclusions, and discuss why they were controversial amongst his contemporaries. They will track the evolutionary history of humans, and explore how different animals have adapted via natural selection to thrive in their individual habitats and contexts. They will explore how fossils provide evidence for evolution, and provide insight as to what life was like millions of years ago, also exploring the work of Mary Anning. They will end by exploring the concept of genetic inheritance, identifying that we receive genetic material from each of our parents, and that some characteristics are dominant, and some recessive.	
Vocabulary	
Evolution, natural selection, Galapagos Islands, HMS Beagle, controversial, survival of the fittest, genes, gametes, genetic materials, characteristics, inheritance, allele, dominant, recessive	

Light (Summer 2)	
LOs and Key Concepts	
1	To understand that light travels in a straight line and not around corners (S1).
2	To understand how light enables us to see by reflecting off of objects (S4).
3	To understand how we see colours and how rainbows are formed (S4).
4	To understand the basic anatomy of an eye and how they enable us to see (S1).
5	To identify and understand angles of reflection and refraction (S4).
6	To use our knowledge of light and reflection to design and make a periscope (S4).
Key Outcomes	
The children will understand that light travels like a wave in straight lines from its source. They will understand the basics of how we see by lighting from a light source bouncing off an object and into our eyes. They will the look at the colour spectrum, and explain how rainbows are formed by light from the sun hitting water and refracting and reflecting. They will then move on to look at the basic anatomy of the eye and how our eye, optic nerve and brain work together to enable us to see. They will then look at angles of reflection and refraction, before applying their knowledge of light to design and create periscopes.	
Vocabulary	
Source, wave, particle, photon, eye, lens, cornea, pupils, retina, rods, cones, optic nerve, brain, prism, reflection, refraction, angle, periscope	

4. Science Reading Spine

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Autumn 1						Nervous system
Autumn 2						Parallel circuits
Spring						
Summer 1					Earth & Space 3	

Summer 2



5. National Curriculum Coverage Table

Year 1 Year 2 Year 3 Year 4 Year 5 Year 6

	Autumn 1	Autumn 2	Spring	Summer 1	Summer 2
Year 1	<p>Unit: Our Bodies</p> <p>Identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense.</p> <p>Find out about and describe the basic needs of animals, including humans, for survival (water, food and air)</p> <p>Describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene.</p>	<p>Unit: Food & Adaptation</p> <p>Identify and name a variety of common animals including, fish, amphibians, reptiles, birds and mammals</p> <p>Identify and name a variety of common animals that are carnivores, herbivores and omnivores</p> <p>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.</p> <p>Construct and interpret a variety of food chains, identifying producers, predators and prey.</p>	<p>Unit: Earth & Space 1</p> <p>Observe changes across the 4 seasons</p> <p>Observe and describe weather associated with the seasons and how day length varies.</p> <p>Recognise that light from the sun can be dangerous and that there are ways to protect their eyes</p> <p>Use the idea of the Earth's rotation to explain day and night, and the apparent movement of the sun across the sky.</p>	<p>Unit: Life Cycles 1</p> <p>Notice that animals, including humans, have offspring which grow into adults</p> <p>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</p>	<p>Unit: Materials 1</p> <p>Distinguish between an object and the material from which it is made</p> <p>Identify and name a variety of everyday materials, including wood, plastic, glass, metal, water, and rock</p> <p>Describe the simple physical properties of a variety of everyday materials</p> <p>Compare and group together a variety of everyday materials on the basis of their simple physical properties</p> <p>Identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for different uses</p> <p>Compare how things move on different surfaces.</p> <p>Find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching</p>

	Autumn 1	Autumn 2	Spring	Summer 1	Summer 2
Year 2	Unit: Muscles & Bones Describe and compare the structure of a variety of common animals (fish, amphibians, reptiles, birds and mammals including pets) Identify that humans and some other animals have skeletons and muscles for support, protection and movement.	Unit: Habitats & Adaptation 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 microhabitats Recognise that environments can change and that this can sometimes pose dangers to living things.	Unit: Plants 1 Identify and name a variety of common wild and garden plants, including deciduous and evergreen trees Identify and describe the basic structure of a variety of common flowering plants, including trees 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 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	Unit: Rocks 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.	Unit: Matter 1 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)

	Autumn 1	Autumn 2	Spring	Summer 1	Summer 2
Year 3	Unit: The Digestive System 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	Unit: Forces & Magnetism 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.	Unit: Earth & Space 2 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	Unit: Food Webs	Unit: Materials 2 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 Give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic

	Autumn 1	Autumn 2	Spring	Summer 1	Summer 2
Year 4	Unit: The Respiratory System	Unit: Electricity 1 Identify common appliances that run on electricity Construct a simple series electrical circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers Identify whether or not a lamp will light in a simple series circuit, based on whether or not the lamp is part of a complete loop with a battery Recognise that a switch opens and closes a circuit and associate this with whether or not a lamp lights in a simple series circuit Recognise some common conductors and insulators, and associate metals with being good conductors. Use recognised symbols when representing a simple circuit in a diagram.	Unit: Plants 2 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.	Unit: Classifications 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 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.	Unit: Matter 2 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 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.

	Autumn 1	Autumn 2	Spring	Summer 1	Summer 2
Year 5	<p>Unit: The Cardiovascular System</p> <p>Identify and name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood</p> <p>Describe the ways in which nutrients and water are transported within animals, including humans.</p> <p>Recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function</p>	<p>Unit: Life Cycles 2</p> <p>Describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird</p> <p>Describe the life process of reproduction in some plants and animals.</p> <p>Describe the changes as humans develop to old age.</p>	<p>Unit: Forces 2</p> <p>Explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object</p> <p>Identify the effects of air resistance, water resistance and friction, that act between moving surfaces</p> <p>Recognise that some mechanisms including levers, pulleys and gears allow a smaller force to have a greater effect</p>	<p>Unit: Earth + Space 3</p>	<p>Unit: Sound</p> <p>Identify how sounds are made, associating some of them with something vibrating</p> <p>Recognise that vibrations from sounds travel through a medium to the ear</p> <p>Find patterns between the pitch of a sound and features of the object that produced it</p> <p>Find patterns between the volume of a sound and the strength of the vibrations that produced it.</p> <p>Recognise that sounds get fainter as the distance from the sound source increases</p>

	Autumn 1	Autumn 2	Spring	Summer 1	Summer 2
Year 6	Unit: The Nervous System	Unit: Electricity 2 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	Unit: Plants 3	Unit: Evolution & Inheritance 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.	Unit: Light 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 shadows are formed when the light from a light source is blocked by a solid object Find patterns in the way that the size of shadows change. Recognise that light appears to travel in straight lines Use the idea that light travels in straight lines to explain that objects are seen because they give out or reflect light into the eye Explain that we see things because light travels from light sources to our eyes or from light sources to objects and then to our eyes Use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them

6. Working Scientifically Progression of Skills

WORKING SCIENTIFICALLY			
EYFS		KS1	
Plan	<ul style="list-style-type: none"> choose the resources they need for their chosen activities and say when they do or don't need help 	Plan	<ul style="list-style-type: none"> ask simple questions and recognising that they can be answered in different ways
Do	<ul style="list-style-type: none"> know about similarities and differences in relation to places, objects, materials and living things make observations of animals and plants explore a variety of materials, tools and techniques, experimenting with colour, design, texture, form and function. select and use technology for particular purposes 	Do	<ul style="list-style-type: none"> observe closely, using simple equipment perform simple tests identify and classify
Record	<ul style="list-style-type: none"> represent their own ideas, thoughts and feelings through design and technology, art, music, dance, role play and stories 	Record	<ul style="list-style-type: none"> gather and record data to help in answering questions
Review	<ul style="list-style-type: none"> talk about the features of their own immediate environment and how environments might vary from one another explain why some things occur and talk about changes 	Review	<ul style="list-style-type: none"> use their observations and ideas to suggest answers to questions

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WORKING SCIENTIFICALLY			
LKS2		UKS2	
Plan	<ul style="list-style-type: none"> ask relevant questions and using different types of scientific enquiries to answer them set up simple practical enquiries, comparative and fair tests 	Plan	<ul style="list-style-type: none"> plan different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary
Do	<ul style="list-style-type: none"> make systematic and careful observations and, where appropriate, take accurate measurements using standard units, use a range of equipment, including thermometers and data loggers 	Do	<ul style="list-style-type: none"> take measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate
Record	<ul style="list-style-type: none"> gather, record, classify and present data in a variety of ways to help in answering questions record findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables 	Record	<ul style="list-style-type: none"> Record data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs
Review	<ul style="list-style-type: none"> report on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions use results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions identify differences, similarities or changes related to simple scientific ideas and processes use straightforward scientific evidence to answer questions or to support their findings 	Review	<ul style="list-style-type: none"> use test results to make predictions to set up further comparative and fair tests report and present 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 identify scientific evidence that has been used to support or refute ideas or arguments

From the Primary Science Teaching Trust (PSTT)