

Reffley Science Curriculum

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Overview

At Reffley Academy,

- Children enjoy science, especially working scientifically.
- Some children do not always use precise technical vocabulary and sometimes describe processes and characteristics in common language.
- Children are developing confidence when planning their own enquiries.

Therefore, the science curriculum, at Reffley Academy, has been planned as follows:

1. Where possible, new learning will be put into context to allow children to understand how science has changed our lives and is vital for the world's future prosperity.
2. Children are given opportunities through practical investigations and experiments to work scientifically and pursue lines of enquiry.
3. At the beginning of each unit teachers make explicit links to previous learning within that discipline for example, a year 5 forces unit would build upon learning around forces and magnets, undertaken in year 3. This is evident within teachers plans and they are aware of future learning.
4. Children are given opportunities to test their ideas, as well as reflecting and evaluating how successful they were.
5. Vocabulary relevant to the area of study is explicitly taught which helps children to articulate their learning.

Intent, Implementation and Impact

Intent	Implementation	Impact
<p>The intention of the science curriculum is to ensure all children:</p> <ul style="list-style-type: none"> • Receive a high quality science education that provides the foundations for understanding the world through the disciplines of Biology, Chemistry, Physics and Earth science. • Understand how science has changed our lives and is vital to the world's future prosperity. • 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 taught the knowledge, methods, processes and uses of science. • To develop independent learning behaviours through science lessons. • To develop as confident and articulate communicators, using the specific scientific vocabulary that is explicitly taught. 	<ul style="list-style-type: none"> • Knowledge is taught through the four main disciplines – Biology, Chemistry, Physics and Earth Science. • Science lessons are taught in blocks of one, two or three week durations. • Objectives have been explicitly broken down into key teaching points to ensure progression and precise content. • Sequences are planned progressively with reference made to the learning that has already taken place as well as future learning. • Lessons are well-planned, using Outstanding Science resources alongside our progression of skills document. • Knowledge Organisers are shared with children and parents at the beginning of a unit of work – they identify the knowledge, skills and vocabulary to be taught. • Work (both written and practical) is recorded in children's learning books. This is in a variety of forms including photographs, annotations and pupil voice. • Teacher assessment for Science takes place and is recorded at the end each sequence taught. This is written as a list of children who are working towards expected, those that are at expected and those who are at greater depth. 	<p>Know more</p> <ul style="list-style-type: none"> • Children are taught age-related content and skills. • Children are introduced to key knowledge and vocabulary relevant to the concept that they are learning. • Vocabulary relevant to the sequence of learning is explicitly taught. • Knowledge Organisers set out the knowledge, skills and vocabulary for a unit of work. <p>Do more</p> <ul style="list-style-type: none"> • Where possible, knowledge is taught in real life contexts with first-hand experience. • Children are given opportunities through practical investigations and experiments to work scientifically and pursue lines of enquiry. • Where suitable, enrichment opportunities are planned to link in with the sequence of learning. <p>Remember more</p> <ul style="list-style-type: none"> • Children build upon knowledge and skills from Reception to Year 6 (see progression document). • At the beginning of each unit, teachers make explicit reference to previous learning including vocabulary. • Lessons are practical wherever possible as active engagement/involvement is more likely to be committed to long term memory. • Children are taught to use their knowledge organisers to aid their memory. These are used within children's individual project books as well as being sent home at the beginning of a sequence of learning. • End of unit quizzes are used as a way of assessing what children know and remember.

Overview of what is taught

EYFS	Science sequences of learning				
	1. Science takes place through 'Free Flow Continuous Provision'. Some examples of specific working in this area include: floating and sinking, speed and momentum, observing changes across the four seasons, identifying and naming a variety of everyday materials, comparing and grouping materials on the basis of their properties, observing how plants grow and how to take care of them, basic life cycles e.g. tadpoles to frogs, healthy snacks.				
	2. Areas set up to support Science: outdoor garden, water play, place to create and make – workshop, sand area, outdoor play, malleable and messy play.				
	3. Adult led activities include making healthy snacks e.g. fruit kebabs, discussing and sorting healthy foods and treats, material sort, lifecycle of a tadpole, planting bulbs and seeds, floating and sinking, magnets.				
Year					
Y1	Seasonal Changes	Everyday Materials	Plants	Animals including Humans	
	-observe changes across the four seasons -observe and describe weather associated with the seasons and how day length varies.	-distinguish between an object and the material from which it is made -identify and name a variety of everyday materials, including wood, plastic, glass, metal, water, and rock --describe the simple physical properties of a variety of everyday materials -compare and group together a variety of everyday materials on the basis of their simple physical properties.	-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.	-identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals -identify and name a variety of common animals that are carnivores, herbivores and omnivores -describe and compare the structure of a variety of common animals (fish, amphibians, reptiles, birds and mammals, including pets) -identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense.	
Y2	Uses of Everyday Materials	Plants	Animals including Humans	Living Things and Their Habitats	
	-identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses -find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching.	-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.	-notice that animals, including humans, have offspring which grow into adults -find out about and describe the basic needs of animals, including humans, for survival (water, food and air) -describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene.	-explore and compare the differences between things that are living, dead, and things that have never been alive -identify that most living things live in habitats to which they are suited and describe how different habitats provide for the basic needs of different kinds of animals and plants, and how they depend on each other -identify and name a variety of plants and animals in their habitats, including microhabitats -describe how animals obtain their food from plants and other animals, using the idea of a simple food chain	

				chain, and identify and name different sources of food.	
Y3	Forces and Magnets	Light	Rocks and Soils	Plants	Animals including Humans
	<ul style="list-style-type: none"> -compare how things move on different surfaces -notice that some forces need contact between two objects, but magnetic forces can act at a distance -observe how magnets attract or repel each other and attract some materials and not others -compare and group together a variety of everyday materials on the basis of whether they are attracted to a magnet, and identify some magnetic materials -describe magnets as having two poles -predict whether two magnets will attract or repel each other, depending on which poles are facing. 	<ul style="list-style-type: none"> -recognise that they need light in order to see things and that dark is the absence of light -notice that light is reflected from surfaces -recognise that light from the sun can be dangerous and that there are ways to protect their eyes -recognise that shadows are formed when the light from a light source is blocked by an opaque object -find patterns in the way that the size of shadows change. 	<ul style="list-style-type: none"> -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. 	<ul style="list-style-type: none"> -identify and describe the functions of different parts of flowering plants: roots, stem/trunk, leaves and flowers -explore the requirements of plants for life and growth (air, light, water, nutrients from soil, and room to grow) and how they vary from plant to plant -investigate the way in which water is transported within plants -explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal. 	<ul style="list-style-type: none"> -identify that animals, including humans, need the right types and amount of nutrition, and that they cannot make their own food; they get nutrition from what they eat -identify that humans and some other animals have skeletons and muscles for support, protection and movement

		associate metals with being good conductors.			
Y5	Earth and Space	Properties and the changes of Materials	Forces	Living Things and their Habitats	Animals including Humans
	<ul style="list-style-type: none"> -describe the movement of the Earth, and other planets, relative to the Sun in the solar system -describe the movement of the Moon relative to the Earth -describe the Sun, Earth and Moon as approximately spherical bodies -use the idea of the Earth's rotation to explain day and night and the apparent movement of the sun across the sky. 	<ul style="list-style-type: none"> -compare and group together everyday materials on the basis of their properties, including their hardness, solubility, transparency, conductivity (electrical and thermal), and response to magnets -know that some materials will dissolve in liquid to form a solution, and describe how to recover a substance from a solution -use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating -give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic -demonstrate that dissolving, mixing and changes of state are reversible changes -explain that some changes result in the formation of new materials, and that this kind of change is not usually reversible, including changes associated with burning and the action of acid on bicarbonate of soda. 	<ul style="list-style-type: none"> -explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object -identify the effects of air resistance, water resistance and friction, that act between moving surfaces -recognise that some mechanisms, including levers, pulleys and gears, allow a smaller force to have a greater effect. 	<ul style="list-style-type: none"> -describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird -describe the life process of reproduction in some plants and animals. 	<ul style="list-style-type: none"> -describe the changes as humans develop to old age.
Y6	Light	Electricity	Evolution and Inheritance	Living Things and their Habitats	Animals including Humans
	<ul style="list-style-type: none"> -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 	<ul style="list-style-type: none"> -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 	<ul style="list-style-type: none"> -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 	<ul style="list-style-type: none"> -describe how living things are classified into broad groups according to common observable characteristics and based on similarities and differences, including microorganisms, plants and animals -give reasons for classifying plants and animals based on specific characteristics. 	<ul style="list-style-type: none"> -identify and name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood -recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function

	<p>eyes or from light sources to objects and then to our eyes</p> <p>-use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them.</p>	<p>the on/off position of switches -use recognised symbols when representing a simple circuit in a diagram.</p>	<p>normally offspring vary and are not identical to their parents</p> <p>-identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution.</p>		<p>-describe the ways in which nutrients and water are transported within animals, including humans.</p>
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Progression of Knowledge and skills

Science – Knowledge Progression Document - Biology			
	EYFS	Y1	Y2
Biology – Plants	<ul style="list-style-type: none"> Looking after plants in the outdoor area – knowing that they need to be watered to stay alive. 	<ul style="list-style-type: none"> Know examples of plants by sight e.g. a rose bush, dandelion and sunflower. Know common trees by sight e.g. Oak, Birch and Horse Chestnut. Evergreen trees maintain their leaves throughout the year and deciduous shed their leaves in Autumn. Flowering plants consist of roots, stem leaves and flowers and a tree's stem is called a trunk. 	<ul style="list-style-type: none"> Seeds and bulbs need to be buried underground and will grow under the right conditions (water and warmth). Plants deprived of light, food or air will not grow and will die.
		Key vocabulary: deciduous, evergreen, trunk, roots, stem	Key vocabulary: temperature, bulb, seed, seedling, survival, predict
Biology – Animals including Humans	<ul style="list-style-type: none"> Preparing healthy snacks and knowing fruits and vegetables are healthy foods. Naming simple body parts. 	<ul style="list-style-type: none"> Know examples of fish, amphibian, reptile, bird and mammal. Herbivores eat plants, carnivores eat other animals and omnivores eat both plants and animals. Vertebrates are animals that have a backbone e.g. humans, fish and birds. Fish have gills, can breathe underwater and have scaly skin. Amphibians begin their lives with gills but then develop lungs and breathe on land. Reptiles breathe air and have scaly skin. Birds have feathers and wings. Mammals have fur/hair and feed milk to their young. Know parts of the body and identify them e.g. feet, legs, head, skin, ears, eyes, nose, mouth and tongue. Know the parts of the body associated with the senses. 	<ul style="list-style-type: none"> Animals produce offspring which grow into adults. Animals need food, water and air to survive. Basic food groups: fruit and vegetables, carbohydrates, protein, dairy, fats and sugary foods. More than half of the diet should be made from carbohydrates, fruit and vegetables. Fats and sugary foods should be eaten rarely and in small amounts. The body needs exercise to stay healthy, strong and fit. Keeping clean, washing hands, brushing teeth are all ways to stay hygienic and an important part of staying healthy.
		Key vocabulary: Amphibian, reptile, bird, mammal, carnivore, omnivore, herbivore	Key vocabulary: Offspring, life cycle, hygiene, exercise, healthy, diet
Biology – Living Things and Their Habitats	<ul style="list-style-type: none"> Basic life cycles of frogs and butterflies from observing the changes that take place. 	Not taught in Y1	<ul style="list-style-type: none"> Living things move, grow, consume nutrients and reproduce; that dead things used to do these things, but no longer do; and that things that never lived have never done these things. Polar bears are an example of an animal adapted to its environment – thick fur for warmth and oily paw pads to ensure that they don't freeze to the ice. Cacti are an example of a plant adapted to its environment – thick skin keeps a store of water safe; sharp spikes keep animals from stealing the water. Woodlice live under logs – an example of a microhabitat - as they need somewhere dark and damp so that they do not dry out. Plants absorb energy from the Sun; that this energy is consumed by

			herbivorous animals; and that carnivorous animals eat other animals.
			Key vocabulary: Birth, decay, energy, habitat, micro-habitat, dead, life cycle, food chain, nutrients, reproduction, consumption, environment, producer, consumer

	Y3	Y4	Y5	Y6
Biology – Plants	<ul style="list-style-type: none"> Different parts of plants have more than one function. Roots collect water and minerals from the soil and hold the plant firmly in the ground. The stem holds up the leaves so they can gather light to make food. The stem also transports water and minerals from the roots to other parts of the plant. The function of the flower is reproduction where flowers of the same kind exchange pollen in a process called fertilisation. Seed dispersal can occur in many ways including: wind, by animals and gravity. 	Not taught past year 3	Not taught past year 3	Not taught past year 3
	Key vocabulary: Nectar, anther, ovary, petal, pollen, stigma, style, stamen, function, seed dispersal, pollination			
Biology – Animals including Humans	<ul style="list-style-type: none"> Proteins are needed for growth and carbohydrates for energy. Fruits and vegetables give us vitamins and minerals which help to keep us healthy. Getting the right amounts of each food group is known as a balanced diet. Excess fat in the diet can cause obesity. Animals including humans have a skeleton made up of solid objects. Some animals e.g. insects have an exoskeleton on the outside of their body. 	<ul style="list-style-type: none"> The process of food passing through the body is called digestion. Digestion involves breaking food into smaller pieces that can be absorbed by the body - this process begins in the mouth with saliva. Humans have 3 types of teeth – incisors, canines and molars. Incisors slice food, canines tear and molars grind. The stomach releases acid and enzymes which break down the food. Know the different parts of the digestive 	<ul style="list-style-type: none"> Humans go through stages of development as they grow older. They begin as fertilized eggs and then develop into embryos before developing into babies. Once they are born, these newborn babies become infants (roughly 2 months to 2 years) then into young children (roughly 2-12 years old). Children develop into adults during adolescence (roughly 12-16 years old) at which age they become physically capable of reproduction. As adults develop into old age (roughly 55+) 	<ul style="list-style-type: none"> The heart and lungs are protected by the ribcage. Blood travels around the body transporting nutrients and oxygen. The role of the heart is to pump the blood around the body and blood vessels carry the blood. Arteries carry blood away from the heart and veins carry blood towards the heart. Capillaries are smaller blood vessels which join veins and arteries together. The heart is composed of four chambers: two atria and two ventricles; the aorta is

	<ul style="list-style-type: none"> Invertebrates have water held inside muscles which act as a skeleton. Skeletons provide support for muscles and protect the body e.g. the skull/cranium protects the brain. Muscles work in pairs with one contracting and the other relaxing. 	<p>system and their function including: stomach, small intestine, large intestine, rectum and anus.</p> <ul style="list-style-type: none"> Food chains pass energy which initially comes from the sun. An animal that is eaten by another is called prey and the animal eating is called a predator. The arrows in a food chain show the direction that energy travels. 	<p>years old) they experience changes in their body which require them to move more carefully and rest more frequently</p>	<p>the largest artery in the body and most major arteries branch off from it.</p> <ul style="list-style-type: none"> When we exercise, our hearts beat faster which in turn improves fitness. Fitter people have lower resting heart rates. Drugs are chemicals that have an impact on our bodies. All drugs can cause problems if they are overused. Some drugs are prescribed by the doctor and can be helpful. Other drugs are illegal and have negative effects on the body.
	<p>Key vocabulary: Vitamin, balanced diet, endoskeleton, exoskeleton, cartilage, contract</p>	<p>Key vocabulary: Digestion, excretion, small intestine, large intestine, stomach, rectum, esophagus, saliva, acid, bile, enzyme, incisors, canines, molars, predator, prey, producer, consumer, primary consumer, secondary consumer, tertiary consumer</p>	<p>Key vocabulary: adolescent, adult, child, foetus, gestation, reproduction</p>	<p>Key vocabulary: artery, aorta, atrium, blood vessels, capillary, circulatory system, vein, pulse, ventricle, resting heart rate, drug</p>
Biology – Living Things and Their Habitats	Not taught in Y3	<ul style="list-style-type: none"> Animals can be grouped based on their physical characteristics (e.g. vertebrates and invertebrates) and based on their behavior (e.g. herbivores, carnivores and omnivores). Living things are divided into kingdoms: the animal kingdom, plants, fungi, bacteria, and single-celled organisms. A species is a group of living things that have many similarities that can reproduce together to produce offspring. Classification key uses questions to sort and identify different living things. Changes to the environment can make it more difficult for animals to survive and reproduce; in extreme cases this leads to extinction, where an entire species dies. Human activity – such as climate change 	<ul style="list-style-type: none"> Life cycle of a living thing is a series of stages of development starting with a fertilized egg in animals or a seed in many plants. In most mammals (e.g. dogs) a fertilized egg develops in the womb into an embryo and is then born and fed on milk before it is weaned onto the food that is adapted to eat; it then develops to maturity in a period called adolescence after which it can reproduce and the cycle can begin again. In amphibians (e.g. frogs) a fertilized egg develops into an embryo and then hatches into a tadpole; the tadpole develops adult characteristics, metamorphoses into the adult form after which it can reproduce and the cycle can begin again In many insects (e.g. butterflies) a 	<ul style="list-style-type: none"> There are three types of micro-organism: viruses, fungi and bacteria. Germs are disease-causing bacteria. An arthropod is an invertebrate with a hard, external skeleton and jointed limbs. Insects are a type of arthropod; their bodies consist of six legs, a head, a thorax and an abdomen; most insects also have a pair of antennae and a pair of wings An arachnid (e.g. spider) is a type of arthropod with eight legs and no antennae or wings. A crustacean is a type of arthropod with two pairs of antennae (e.g. woodlouse). A myriapod is an arthropod with a flat and long or cylindrical body and many legs (e.g. centipede).

		<p>caused by pollution - can change the environment for many living things, endangering their existence. The polar bear is an example of this.</p>	<p>fertilized egg develops into wingless feeding form called a larva (caterpillar); the larva feeds then later becomes a pupa (chrysalis) with a protective cocoon; inside this cocoon, the pupa metamorphoses into the adult butterfly after which it can reproduce and the cycle can begin again.</p> <ul style="list-style-type: none"> • In birds (e.g. robins) a fertilized egg hatches in a nest (a hatchling) and is fed by its parents until it is ready to fly (i.e. becomes a fledgling); it then leaves the nest and grows into an adult after which it can reproduce and the cycle can begin again. 	
		<p>Key vocabulary: environment, vertebrate, invertebrate, microhabitat (all revision) kingdom, classification key, species, fungi, bacteria, climate change, characteristics, offspring, extinction, pollution</p>	<p>Key vocabulary: life cycle, life span, weaned, metamorphosis, pupa, larva, chrysalis, hatchling, fledgling, insect</p>	<p>Key vocabulary: Micro-organism, virus, thorax, arthropod, abdomen, arachnid, antenna, jointed limbs</p>
Biology – Evolution and Inheritance	Not taught in Y3	Not taught in Y4	Not taught in Y5	<ul style="list-style-type: none"> • All life on Earth began from a single point around 4.5 billion years ago. • Living things change over time and this gradual change is called evolution. • Natural selection is the cause of this change; natural selection works as across a species there is natural variation within a species; there is also competition to survive and reproduce and that members of a species with advantageous characteristics survive and reproduce - these characteristics are passed down to their offspring. • Members of a species with less advantageous characteristics do not survive and reproduce – these characteristics are not passed down to offspring.

				<ul style="list-style-type: none"> Offspring vary and are not identical to their parents. Charles Darwin developed this theory of evolution by natural selection. The gradual change of species over millions of years can be observed by looking at examples of fossil.
				Key vocabulary: species (revision), evolution, natural selection, variation, advantageous, inheritance, adapt, ancestor

Science – Knowledge Progression Document - Chemistry				
	EYFS	Y1	Y2	
Chemistry	<ul style="list-style-type: none"> Know the properties of basic materials e.g. wood is hard and strong. 	<ul style="list-style-type: none"> An object is made from a material e.g. a door is an object and can be made from wood. Materials by sight such as wood, glass, metal, plastic and rock. Materials have different properties such as being rough, smooth, hard, strong, heavy, light, absorbent. Materials can be grouped by their properties e.g. all the smooth ones grouped away from the rough. 	<ul style="list-style-type: none"> Materials can have useful properties for a given job (including being waterproof, strong, hard, soft, flexible, rigid, light or heavy.) Many types of plastic are waterproof, that steel (a type of metal) is strong, that rock is hard, that cotton wool is soft, that rubber is flexible, that rock is rigid, that polystyrene (a type of plastic) is light and that iron (a type of metal) is heavy. When objects move across a surface there is friction when they rub against each other. Applying forces to objects can change their shape 	
		Key vocabulary: Property, water, glass, plastic, rock, wood, metal, absorbent, natural, man-made	Key vocabulary: Absorption, friction, suitability, surface, stretch, twist, rigid, flexible, smooth, rough, waterproof	

	Y3	Y4	Y5	Y6
Chemistry	<ul style="list-style-type: none"> There are three kinds of rocks: igneous, sedimentary and metamorphic. Earth has a solid crust made up of tectonic plates with molten rock beneath. Granite and Basalt are types of igneous rock and that igneous rocks form from molten rock below the Earth's crust. Limestone and sandstone are types of sedimentary rock which form when small, weathered fragments of rock or 	<ul style="list-style-type: none"> Materials consist of solids, liquids and gases. Materials can change state when the temperature changes. Particles in a solid are closely packed together. In a liquid they are further apart and in a gas there is lots of space between them. When solids turn to liquids this is called melting and the reverse is freezing. When liquids turn to gas this is called evaporation and the 	<ul style="list-style-type: none"> In some solid materials the bonds between particles break when surrounded by a liquid; this allows the liquid to absorb the solid; when this happens, the solid is called a solute, the liquid is called a solvent and the result is a solution; when a solid does dissolve in a liquid it is described as being soluble in that solvent (e.g. sugar in water); when it cannot it is insoluble (e.g. sand in water). A solvent can only dissolve a certain 	Not taught in Y6

	<ul style="list-style-type: none"> shell settle and stick together, often in layers. Marble and slate are types of metamorphic rock which form when rocks in Earth's crust get squashed and heated in processes such as when tectonic plates press against each other. Fossils form when a plant or animal dies and is quickly covered with silt or mud so that it cannot be rotted by microbes or eaten by scavenging animals. Soil is made from tiny particles of rock broken down by the action of weather (weathering). 	<ul style="list-style-type: none"> reverse is called condensation. The melting point of water is 0°C and the boiling point is 100°C. Water flows around the world in a continuous process known as the water cycle. Water condenses in clouds and falls to the ground as rain, snow or hail in a process called precipitation. 	<ul style="list-style-type: none"> amount of solid before no more can dissolve (saturated). When a solvent is evaporated from a solution, the original solute is left behind. A reversible change is one that can be reversed and that examples of this are mixing, dissolving and changes of state where no chemical reaction takes place. An irreversible change is one that cannot be reversed and that examples of this often involve a chemical change where a new material is made, often a gas. Filtering allows solids and liquids to be separated and that sieving allows solids made up of different sizes parts to be separated. 	
	<p>Key vocabulary:</p> <p>Igneous, metamorphic, sedimentary, palaeontologist, weathering, crust, tectonic plates, fossil, magma, porous</p>	<p>Key vocabulary:</p> <p>absorb, dissolve, evaporation, bond, condensation, reversible, boiling point, melting point, liquid, gas, water cycle, precipitation, transpiration, surface run off</p>	<p>Key vocabulary:</p> <p>Irreversible, soluble, insoluble, solvent, solute, solution, filter, sieve, saturation, thermal, chemistry</p>	

Science – Knowledge Progression Document – Physics (not taught within KS1)				
	Y3	Y4	Y5	Y6
Physics - Forces	<ul style="list-style-type: none"> A force can be thought of as a push or pull. Objects move differently on different surfaces. They are harder to move on rough surfaces because of the higher friction force acting on the object. Non-contact forces can act when objects are not touching e.g. magnetic force. Magnets have two poles – North and South. A magnetic field acts around a magnet which is strongest at each pole. 	Not taught in Y4	<ul style="list-style-type: none"> Force is measured in Newtons after Sir Isaac Newton. Pull forces can be measured using a force meter. The amount of matter in an object is its mass. Unsupported objects are pulled towards Earth by gravity. Acceleration is a change in speed. Air resistance is a force felt by an object as it moves through the air; it is caused by the object bumping into the gas particles that make up air; the quicker an object moves, the more gas 	Not taught in Y6

	<ul style="list-style-type: none"> Opposite poles of the magnet attract and the same poles repel each other. Some materials are magnetic meaning they attract to a magnet although not all metals are magnetic. 		<p>particles it bumps into and the more air resistance it experiences.</p> <ul style="list-style-type: none"> A falling object will accelerate until its air resistance matches the gravitational force pulling it down; at this point, the object will continue to move at this speed (called its terminal velocity) without getting any quicker or slowing down. A parachute increases air resistance. Water resistance is a force felt by an object as it moves through water; it is caused by the object bumping into the water particles. The shape of an object determines how much air resistance or water resistance it experiences; shapes of object that experience little air resistance or water resistance are described as streamlined. A lever is a rigid length pivoting around a fulcrum. A pulley is a wheel with a fulcrum that supports a moving cable or belt. Gears, levers and pulleys are simple machines that used to allow a smaller force to have a greater effect; they do this by moving a smaller force over a longer distance at one end of the machine, which the machine turns into a larger force over a small distance at the other end. 	
	<p>Key vocabulary:</p> <p>Force, push, pull, friction, magnetic, non-magnetic, pole, attract, repel</p>		<p>Key vocabulary:</p> <p>Acceleration, air-resistance, buoyancy, effort, force meter, fulcrum, gravity, load, mass, Newton, pivot, rigid, streamlined, terminal velocity, unsupported, water resistance</p>	
Physics – Light	<ul style="list-style-type: none"> Light is a form of energy. 	Not taught in Y4	Not taught in Y5	<ul style="list-style-type: none"> Translucent objects allow some light to pass through, but some

	<ul style="list-style-type: none"> • Dark is the absence of light and we need light to see things. • Light travels in straight lines. • Light is reflected when it travels from a light source and bounces off an object. • The sun is a light source but the moon just reflects the light from the sun. • Many light sources give off heat and light. • We can either see something because it is a light source or it reflects the light from a light source. • Sunglasses protect the eyes from the sun and it is dangerous to look directly at the sun. • Opaque objects block the light source which creates a shadow. • As objects get closer to the light source the size of the shadow increases. 		<ul style="list-style-type: none"> of the light changes direction as it passes through the object; this means that something seen through a translucent object is not clearly defined. • When light passes from one medium to another (e.g. from air to water), it changes direction; this is called refraction; this happens because light travels at different speeds in different media. • White light comprises all the colours of light. • White light refracted by two surfaces in a prism will spread out so that all of its constituent colours can be seen; this array of colours is called a spectrum; it happens because the different colours of that constitute white light travel at different speeds. • When light reflects off an object, the angle of incidence is equal to the angle of reflection. • A periscope takes advantage of the predictable angles of incidence and reflection to allow an image to be shown to a viewer. 	
	Key vocabulary: reflection, transparent, translucent, opaque, mirror, incident ray, image, beam, photons, solid, source			Key vocabulary: reflection, incident ray, translucent (all revision), angle of incidence, angle of reflection, refraction, spectrum, periscope, medium
Physics – Electricity	Not taught in Y3	<ul style="list-style-type: none"> • Electricity is a form of energy. • Electrical current flows well through some materials, called electrical conductors, and poorly through other materials, called electrical insulators. • Metals are good electrical conductors. • More than one cell lined up to work 	Not taught in Y5	<ul style="list-style-type: none"> • Voltage is the measure of power of a cell to produce electricity. It is the measure of the push of electric current not the size of the electric current. • As the number and voltage of cells in a circuit increases, the brightness of a bulb or the volume of a buzzer will increase (though too high a voltage may

		<p>together is called a battery.</p> <ul style="list-style-type: none"> • Electrical current can flow if there is a complete circuit. • Wires – which contain a conductor inside them, usually made of metal – can allow electrical current to flow around a circuit. • When electrical current flows through a circuit, components within that circuit – such as buzzers which make a noise and bulbs which emit light – begin to work. • A switch functions by completing or breaking a complete circuit. • How to construct a simple circuit using components. • Exposure to high levels of electrical current can be dangerous. 		<p>'blow' the bulb or buzzer).</p> <ul style="list-style-type: none"> • Know how to draw simple circuit diagrams. • Know the recognized symbols for a battery, bulb, motor, buzzer and wire. • Predict whether components will function in a given circuit, depending on whether or not the circuit is complete; whether or not a switch is in an on or off position; and whether or not there is a cell to provide electrical current to the circuit. • Two bulbs in a circuit can be wired up to create a series circuit or a parallel circuit; if one bulb blows in a series circuit the other will not shine as the circuit has been broken; in contrast, if one bulb blows in a parallel circuit, there will still be a complete circuit for the other bulb so it will continue to shine.
		<p>Key vocabulary: conductor, insulator, circuit, electron, battery, cell, static electricity, current electricity, positive terminal, negative terminal, emit</p>		<p>Key vocabulary: Circuit, conductor, insulator, current, switch (all revision), parallel circuit, resistance, series circuit, voltage</p>
Physics – Sound	Not taught in Y3	<ul style="list-style-type: none"> • Sound is generated when an object vibrates; some of the energy from the vibrating object is transferred to the air, making the air particles move. • Sound is a form of energy that transfers in a longitudinal wave. • Sound travels through a medium (e.g. particles in the air) and thus sounds does <u>not</u> travel through a vacuum which has no particles in it at all. • Pitch is how high or low a sound is and that this is determined by how many vibrations per second are being made 	Not taught in Y5	Not taught in Y6

		<p>by the vibrating object; the number of vibrations per second is called frequency.</p> <ul style="list-style-type: none"> Volume is how loud or quiet a sound is and that this is determined by the amount of energy in the wave (e.g. from how hard or soft a percussion instrument is hit). Volume of a sound is quieter if the listener is further away from the object. 		
		<p>Key vocabulary: particle, vibration, percussion instrument, wind instrument, string instrument, frequency, volume, pitch, longitudinal wave, vacuum</p>		

Science – Knowledge Progression Document – Earth Science				
	EYFS	Y1	Y2	
Earth Science	<ul style="list-style-type: none"> Name the different seasons and observe and describe the weather for each season e.g. know that in the summer it is hot and the winter is cold, the winter is when it might snow etc. 	<ul style="list-style-type: none"> Days are longer in the summer and shorter in the winter. The weather changes throughout the year, getting hotter in the summer and colder in the winter. In the winter it is likely to be cold with ice on the ground when water freezes. The Earth orbits the sun with one orbit lasting 365/366 days. 	Not taught in Y2	
		<p>Key vocabulary: Freezing, melting, orbit, sun, clouds, wind, snow, ice, Summer, Spring, Autumn, Winter, season</p>		

Science – Knowledge Progression Document – Earth Science				
	Y3	Y4	Y5	Y6
Earth Science	Not taught in Y3	Not taught in Y4	<ul style="list-style-type: none"> A star is a hot ball of gas, made from hydrogen and helium. The sun is a star. There are eight major planets in our solar system: Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, Neptune. The universe is utterly vast and that our solar system makes up a tiny fraction of the universe A satellite orbits a planet and that moons are natural satellites. 	Not taught in Y6

			<ul style="list-style-type: none"> • The Moon orbits the Earth roughly every 28 days. • Know that as the Moon orbits the Sun, different parts of it are lit up by the Sun, which is why we see a different shape lit up on the Moon as the lunar cycle progresses. • All the planets in the solar system orbit the Sun and that the further away they are from the Sun, the longer their orbit. • The Earth spins around an imaginary line through its centre called an axis and that this axis is tilted relative to the Earth's orbit. • Night and day are the result of the Earth rotating on its axis. • The tilt of the Earth towards and away from the Sun's light as the Earth orbits the Sun leads to the seasons. • A solar eclipse occurs when the Moon is between the Sun and the Earth, casting a shadow on the Earth; a lunar eclipse occurs when the Earth is between the Sun and the Moon, casting a shadow on the Moon 	
			<p>Key vocabulary:</p> <p>Planet, satellite, sphere, solar system, eclipse, star, universe, constellation, axis, celestial body, moon, rotating, telescope, orbit (revision)</p>	

Science – Skills Progression Document – Working Scientifically			
	EYFS	Y1	Y2
Working Scientifically	<ul style="list-style-type: none"> Ask questions in order to find things out. Know how to test a simple idea e.g. does an object float or sink using objects in the water tray. 	<ul style="list-style-type: none"> Use a magnifying glass to observe objects closely and verbalise what can be seen. Identify and sort objects into groups depending on their properties. 	<ul style="list-style-type: none"> Test questions to see if they are true. Record numbers, words or pictures as a way of recording results. Observe and describe what happens over a period of time e.g. plants growing in different conditions. Identify and classify e.g. living, dead and never alive and describe the difference between these groups. Observe animals and plants closely within their natural habitat and record what is found in the form of a tally chart.
	Key vocabulary: magnifying glass, sort, group, observe		
	Key vocabulary: record, results, classify, tally chart, compare		

Science – Skills Progression Document – Working Scientifically				
	Y3	Y4	Y5	Y6
Working Scientifically	<ul style="list-style-type: none"> Ask questions and answer them by setting up scientific enquiries. Make relevant predictions which can be tested. Carry out a fair test where only one variable is altered. Use rulers and stopwatches to measure accurately. Draw bar charts and tables as a way of recording results. Verbalise the method for a scientific enquiry and the results that were found. 	<ul style="list-style-type: none"> Carry out a fair test, identifying the dependant and independent variable. Use thermometers, stopwatches and data loggers to measure accurately. Use labelled diagrams, coloured keys and charts as a way of recording results. Write up a simple scientific enquiry including: introduction, list of equipment, method, results and conclusion. Discuss the accuracy of an experiment and suggest ways to improve the accuracy of results. Carry out additional tests as a way to improve reliability. Ask follow up questions as a result of carrying out an enquiry. 	<ul style="list-style-type: none"> Choose appropriate variables to test a hypothesis e.g. the time it takes for something to dissolve as a dependent variable when measuring the effect of temperature. Accurately use equipment such as scales, measuring beakers, cylinders, force meters to carry out enquiries. Independently write a scientific enquiry including an introduction, list of equipment, method, results and conclusion. Know and identify the different types of scientific enquiry including: observing over time, pattern seeking, identifying, classifying and grouping, comparative or fair testing and researching using secondary sources. Record data using complex scientific diagrams, labels and tables. 	<ul style="list-style-type: none"> Know how and when to repeat measurements, find an average set of measurements and identify outliers to improve the accuracy of measurements. Independently write a scientific enquiry including an introduction, list of equipment, method, results and conclusion. Present findings from an enquiry orally and with confidence, using notes or aid (e.g. powerpoint) where necessary. Identify examples where scientific evidence has been used to support or refute ideas e.g. fossil records as evidence of natural selection. Record data using complex tables and line graphs. Use test results to make predictions and set up further comparative and fair tests.
	Key vocabulary: variable, fair test, prediction, enquiry, stopwatch, bar chart, equipment, method	Key vocabulary: dependent variable, independent variable, accurate, thermometer, conclusion, reliability	Key vocabulary: hypothesis, cylinder, beaker, force meter, observing over time, pattern seeking, comparative/fair testing	Key vocabulary: outlier, average, scientific evidence, line graph