SCIENCE

LEARNING SEQUENCE

- **EHCP & SEND Support refer to IEPs for the individual children.**
- **Minimum assessment for learning strategies to be used during every lesson: target questioning, peer talk, modelling, mini-plenaries, self-assessment, referral to success criteria.**
- **Long term memory development strategies to be used in every lesson through assessing prior knowledge at beginning of the unit and in the lesson.**
- **Essential Knowledge highlighted red is the minimum key learning for every child within each unit of work.**
- **Essential vocabulary highlighted red is the minimum key learning for every child within each unit of work.**

EYFS	Communication and Language	Numeracy	Understanding The World	PSED	Literacy
	• Listen attentively and respond to what they hear with relevant questions, comments and actions when being read to and during whole class discussions and small group interactions • Make comments about what they have heard and ask questions to clarify their understanding • Hold conversation when engaged in back-and-forth exchanges with their teacher and peers. • Participate in small group, class and one-to-one discussions, offering their own ideas, using recently introduced vocabulary • Offer explanations for why things might happen, making use of recently introduced vocabulary from stories, non-fiction, rhymes and poems when appropriate • Express their ideas and feelings about their experiences using full sentences, including use of past, present and future tenses and making use of conjunctions, with modelling and support from their teacher.	• Verbally count beyond 20, recognising the pattern of the counting system • Compare quantities up to 10 in different contexts, recognising when one quantity is greater than, less than or the same as the other quantity	• 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.	• Give focused attention to what the teacher says, responding appropriately even when engaged in activity, and show an ability to follow instructions involving several ideas or actions • Be confident to try new activities and show independence, resilience and perseverance in the face of challenge • Manage their own basic hygiene and personal needs, including dressing, going to the toilet and understanding the importance of healthy food choices. • Work and play cooperatively and take turns with others	• Use and understand recently introduced vocabulary during discussions about stories, non-fiction, rhymes and poems and during role-play • Read aloud simple sentences and books that are consistent with their phonic knowledge, including some common exception words • Write simple phrases and sentences that can be read by others.

YEAR 1	Rationale	Key content from NC	Skills/Processes	Essential Knowledge	Vocabulary
Autumn 1 Every day Materials (Chemistry)	**Scope:** In Year 1, pupils are provided with an opportunity to explore everyday materials. They learn to distinguish between an object and the material from which it is made and learn to identify and name a variety of everyday materials. In addition, pupils learn to describe the simple physical properties of a variety of everyday materials and to compare and group together a variety of everyday materials based on simple physical properties of the materials. **Sequence:** The content from this unit leads directly into the 'Uses of Materials' unit in Year 2 and then subsequent materials across Key Stage 2. All chemistry units are about materials, or matter and being able to identify materials and the properties of those materials is a thread which will flow through all of them despite the vocabulary used being different. This unit is deliberately placed alongside the geography unit 'My Local Area' so that links can be made between the two subjects	• what materials are and the names of different materials • what different materials look like • which materials different objects are made from • what some the properties of different materials are and if materials can have other properties • some properties are easy to see but others need to be investigated • how the properties of materials mean they are used to make certain objects • how to group, sort, and compare objects and materials	Working Scientifically Key Stage 1: • asking simple questions and recognising that they can be answered in different ways • observing closely, using simple equipment • performing simple tests identifying and classifying using their observations and ideas to suggest answers to questions • gathering and recording data to help in answering questions. Working Scientifically' is embedded into each unit. Children will have opportunities to take part in: • Observations over time • Pattern seeking • Identifying, classifying and grouping • Comparative and fair testing • Researching using secondary sources	• There are many different materials • A material is something we can use to make different objects • There are different materials around our school • There are many different objects around us an object is different to a material • Some objects are made from one material • Some objects are made from more than one material • Different materials have different properties • We can find out some of those properties by investigating how materials look and feel • We can describe materials by using their properties • Materials can have other properties • Some of these properties are not easy to see or feel • We can investigate materials to discover other properties • Objects are made from different materials • They are chosen because of their properties • Some materials are a good choice for an object Some materials are a bad choice for an object • Objects can be made of different materials	• absorbent • bad idea • bendy • compare • dry • dull • fabric • glass • good idea • group • hard • investigate • material • metal • not absorbent • not bendy • not waterproof • opaque • paper • plastic • rock • rough • shiny • smooth • soft • sort • stiff • stretchy • transparent • umbrella • Venn diagram • water • water object • waterproof • wet • wood

				• Different materials have different properties • Materials can have many properties • We can sort and group objects using the properties of the materials they are made from	
Autumn 2 Autumn and Winter (Physics)	**Scope:** In Year 1 pupils observe changes across the four seasons. They observe and describe weather associated with the seasons and how the length of a day varies. This unit focusses on two seasons: autumn and winter. **Sequence:** Autumn and Winter is the first physics unit pupils will encounter and is the first of two Year 1 units designed to look at seasons and seasonal changes. The National Curriculum states that pupils should observe the changes across the four seasons, and therefore the decision has been made to teach the knowledge across two units rather than one. By teaching the unit at this point in the year, pupils can observe the changes from autumn to winter for themselves.	• names of the four seasons • which months are in each of the four seasons • what we mean by the word 'weather' • weather patterns, weather symbols and what the weather is like in both autumn and winter • how we, as humans, might dress differently according to the weather outside • how daylight hours change across autumn and winter • the impact of changing weather and seasons on different plants and animals	Working Scientifically Key Stage 1: • asking simple questions and recognising that they can be answered in different ways • observing closely, using simple equipment • performing simple tests identifying and classifying using their observations and ideas to suggest answers to questions • gathering and recording data to help in answering questions. Working Scientifically' is embedded into each unit. Children will have opportunities to take part in: • Observations over time • Pattern seeking • Identifying, classifying and grouping • Comparative and fair testing • Researching using secondary sources	• There are four seasons • Each season has a different name • The seasons are autumn, winter, spring and summer • There are different months in each season. • We can use symbols to show what the weather is like • Weather forecasts tell us what the weather is going to be like • In autumn, it gets colder and the weather can be sunny, cloudy, windy or rainy • We need to wear clothes in autumn that keep us warm. • In autumn, we can see many changes in the world around us • Leaves change colour and fall from the trees • We can see lots of berries and nuts • Animals begin to act differently in the autumn. • The temperature gets colder from autumn to winter	• active • adapt • animals • autumn • colder • daylight • fall • forecasts • fruit • fungi • hibernate • leaves • longer • migration • month • nuts • season • shorter • sleet • snow • spring • summer • temperature • warmer • weather • (weather descriptions) • winter • year

				• Some trees lose their leaves and become bare in winter • The days get shorter as we get fewer hours of daylight in winter • In winter, the weather gets colder • It can snow in winter, but it does not have to snow. • We need to wear clothes in winter to keep ourselves warm. • In winter, animals change the way they behave. • Some animals hibernate for the winter • Some animals stay near their homes in winter • Some animals are still active in winter.	
Spring 1 and Spring 2 Amazing Animals (Biology)	**Scope:** In Year 1, pupils learn to identify and name a variety of common animals. They learn to identify and name carnivores, herbivores and omnivores and to describe and compare the structure of a variety of animals. In addition, pupils are taught to identify, name, draw and label the basic parts of the human body and say which part is associated with each sense. **Sequence:** This unit builds on pupils' Understanding of the World In Reception, pupils learnt about similarities and differences between living things, made observations, explained why things occur and talked about changes. By looking at the natural world, pupils in Year 1 begin to build their scientific vocabulary, with words such as amphibian and omnivore. In science Unit 1 and history Unit 2, pupils grouped items according to their properties. Unit 3 introduces the concept of classifying	• recognise and name a variety of common animals including fish, amphibians, reptiles, birds, and mammals • recognise and name a variety of common animals that are carnivores, herbivores, and omnivores • know similarities and differences across a variety of common animals (fish, amphibians, reptiles, birds, and mammals, including pets) • recognise and name the basic parts of the human body and say which part of the body is associated with each sense	Working Scientifically Key Stage 1: • asking simple questions and recognising that they can be answered in different ways • observing closely, using simple equipment • performing simple tests identifying and classifying using their observations and ideas to suggest answers to questions • gathering and recording data to help in answering questions. Working Scientifically' is embedded into each unit. Children will have opportunities to take part in: • Observations over time • Pattern seeking	• There are many different types of animal. • Animals can be described in a number of ways. • Animals are living things that eat, grow, breathe, reproduce and move. • Animals can be grouped into categories. • The five vertebrate animal categories are: mammals, birds, fish, amphibians and reptiles. • The animals in each category share special characteristics. • Mammals are warm blooded. • Mammals are vertebrates, which means they have a backbone. • Mammals have fur or hair.	• amphibian • animals • backbone • beak • birds • carnivore • characteristics • claws • cold blooded • describe • diet • differences • ears • exercise • eyes • feathers • fins • fish • freshwater • gills • hearing • herbivore • lungs

	animals. Pupils will understand that scientists look at commonalities between animals and use similarities to group them.		• Identifying, classifying and grouping
			• Comparative and fair testing
			• Researching using secondary sources
				• Mammals give birth to live young.
				• Mammals feed their young with their milk.
				• Humans are mammals.
				• Both reptiles and amphibians:
				  ○ are cold blooded
				  ○ are vertebrates
				  ○ live in water and on land
				• Amphibians have soft skin but reptiles have dry, scaly skin
				• Amphibians lay eggs in water, whereas reptiles lay eggs on land
				• Amphibians have gills when they are born to breathe underwater (they develop lungs to breathe air as they grow)
				• Reptiles cannot breathe underwater but have lungs to breathe air when they are born.
				• Birds have feathers, wings and a beak
				• Birds are warm blooded
				• Birds lay eggs
				• Birds are vertebrates
				• Most birds can fly
				• Fish live in water
				• Fish have gills to breathe in water
				• Most fish are cold blooded vertebrates
				• Most fish lay eggs
				• Most fish have scales to protect their bodies and fins to help them swim
				• Fish don't have legs
				• Animals from different categories can share
					• mammal
					• medicine
					• mouth
					• nose
					• omnivore
					• pet
					• reproduce
					• reptile
					• saltwater
					• scales
					• shelter
					• sight
					• similarities
					• skeleton
					• skin
					• skull
					• smell
					• taste
					• touch
					• vertebrate
					• warm blooded
					• wild animal
					• wings

				similar characteristics, for example, ○ mammals, fish, birds, amphibians and reptiles ○ are all vertebrates ○ reptiles, amphibians and fish are all cold-blooded ○ amphibians, reptiles, fish and birds all lay eggs ○ Birds and mammals are warm blooded • Animals that eat other animals are called carnivores • Animals that eat plants are called herbivores • Animals that eat both plants and other animals are called omnivores • Some animals are suitable for keeping as pets but some are not • Pets need food, water, space, shelter and medicine • Animals that are not pets are known as wild animals • All humans have a skeleton • The bones in your skeleton help you to stay standing up, let you move around and protect the important organs inside you • Skin protects the skeleton and organs • We have five senses: sight, hearing, touch, taste and smell	

				• We use different body parts for each sense • Our senses help to look after us	
Summer 1 Spring and Summer (Physics)	**Scope:** In Year 1, pupils observe changes across the 4 seasons. They observe and describe weather associated with the seasons and how the length of a day varies. This unit focusses on two seasons: spring and summer. **Sequence:** The National Curriculum states that pupils should observe the changes across the four seasons, and therefore the decision has been made to teach the knowledge across two units rather than one. By teaching the unit at this point in the year, pupils can observe the changes from spring to summer for themselves.	• how the weather changes from winter to spring • what happens to plants and animals in spring and summer • what changes can be seen in the weather from spring to summer • understand how the changing seasons can affect humans	Working Scientifically Key Stage 1: • asking simple questions and recognising that they can be answered in different ways • observing closely, using simple equipment • performing simple tests identifying and classifying using their observations and ideas to suggest answers to questions • gathering and recording data to help in answering questions. Working Scientifically' is embedded into each unit. Children will have opportunities to take part in: • Observations over time • Pattern seeking • Identifying, classifying and grouping • Comparative and fair testing • Researching using secondary sources	• There are four seasons in a year: spring, summer, autumn and winter. • There are twelve months in a year. • There are different months in each season. • Each season looks and feels different. • As the season changes from winter to spring, the days get longer and we have more daylight. • In spring the temperature gets warmer. • Spring weather can vary from warm and sunny to cold and rainy. • Spring is the season of new life. • The warmer weather and longer daylight hours make plants, trees and flowers bud and blossom. • In spring, animals start to have babies. • Summer is the warmest season in the UK and has the highest temperatures. • Summer has the most daylight hours. • In the summer, it is important to stay safe in the sun. • The warm sunny days of summer help plants to grow and flower. • Many trees and plants produce fruit and vegetables during summer.	• activities • affect • autumn • average • bees • beetle • birdsong • blossom • bluebells • bud • butterflies • celebrations • cherry blossom • cooler • crocuses • crop • daffodils • daylight • degrees Celsius • ducklings • festivals • flowers • frogspawn • fruit • grasshopper • harvest • hobbies • ladybird • leaves • month • pictogram • rainfall • season • seasonal • snowdrops • spring • summer • temperature • variable • vegetable

				• Summer is filled with the buzzing of bees, and lots of activity from other insects. • Humans do different activities during different seasons. • The weather of each season affects the hobbies that humans have throughout the year. • Different festivals and celebrations take place in different seasons.	• warmer • weather • winter • year
Summer 2 Common Plants (Biology)	**Scope:** In Year 1, pupils identify and name a variety of common wild and garden plants, including deciduous and evergreen trees. They also identify and describe the basic structure of a variety of common flowering plants, including trees. **Sequence:** This is the first unit on the topic of plants. Pupils have observed their local environment throughout the year in the two seasons units and they have learnt the names of some common season plants. This unit builds on pupils' understanding of the seasons by demonstrating how different plants are present in their local environments during different times of the year.	• what a plant is and the basic parts of a plant • recognise and name common garden plants • recognise and name common wild plants • recognise and name different types of trees • know why plants are important	Working Scientifically Key Stage 1: • asking simple questions and recognising that they can be answered in different ways • observing closely, using simple equipment • performing simple tests identifying and classifying using their observations and ideas to suggest answers to questions • gathering and recording data to help in answering questions. Working Scientifically' is embedded into each unit. Children will have opportunities to take part in: • Observations over time • Pattern seeking • Identifying, classifying and grouping • Comparative and fair testing • Researching using secondary sources	• Plants are living things that grow. • Plants can be found in homes, gardens, parks and the countryside. • Plants can be different sizes, shapes and colours. • Weeds, grass, moss, ferns, shrubs flowers and trees are all plants. • Plants can grow in soil (like sunflowers) or water (like waterlilies). • Plants have three important parts: the roots, the stem and the leaves. • Roots keep the plants in the ground and take in water from the soil. • The stem holds up the plant and carries water to the leaves. • Leaves take in the sunshine and turn it into food for the plant. • Garden plants are plants that people choose to grow in their gardens. • Common summer garden plants include: roses,	• air • bark • blossom • brambles • bulbs • buttercup • clothing • clover • cotton • daisy • dandelion • deciduous • evergreen • farmer • fern • flower • food • fruit • garden plant • grass • grow • honeysuckle • hydrangea • insects • ivy • lavender • leaves • living thing • magnolia tree • marigold

				sunflowers, lavender, primula, sweet pea, marigolds, honeysuckle, magnolia trees and hydrangeas. • People choose to grow plants for different reasons, such as: they're easy to grow, they smell pleasant, they look beautiful, or they attract insects. • A wild plant doesn't need to be looked after as it grows. • Wild plants grow from seeds wherever they fall. • Common summer wild plants include: daisies, buttercups, nettles, ivy, thistles, dandelions, clover, brambles and poppies. • The stem of a tree is known as a trunk and is covered in bark. • When trees flower, their flower is known as blossom. • Different trees can be identified by their leaves. • A deciduous tree is a tree that sheds its leaves in autumn. • An evergreen tree is a tree that has leaves on it all year. • Plants are very important. • Plants create the air we breathe. • Plants can be used to make medicine and materials. • Farmers grow fruit and vegetables. These plants give us food.	• medicine • moss • nettle • petals • plant • pod • poppies • primula • raw • roots • rose • seeds • shrub • soil • stem • sunflower • sweet pea • thistle • tree • trunk • weed • wild plant

				• Different parts of plants are eaten: their roots, stems, leaves, flowers, seeds, fruit and bulbs.	
YEAR 2	**Rationale**	**Key content from NC**	**Skills/Processes**	**Essential Knowledge**	**Vocabulary**
Autumn 1 Animals – Needs for Survival (Biology)	**Scope:** In Year 2, pupils are taught to find out about and describe the basic needs of animals, including humans, for survival (water, food, air). They learn to recognise that animals, including humans, have offspring and to describe the importance of exercise, eating the right amounts of types of foods and of hygiene for humans. **Sequence:** In Year 1, pupils gained a strong foundational knowledge of what all living things do. They were introduced to the different types of vertebrate animals (those with a backbone) and learnt about common animals including fish, amphibians, reptiles, birds, and mammals. During classification and identification work, pupils observed similarities and differences between species. From this learning, pupils already understand that humans are mammals and belong to the animal kingdom.	• the things that animals need to survive. • know how animals change as they grow know why exercise is important to health • what a balanced diet is and apply this knowledge to understanding their own diet • understand what hygiene is and why it is important	Working Scientifically Key Stage 1: • asking simple questions and recognising that they can be answered in different ways • observing closely, using simple equipment • performing simple tests identifying and classifying using their observations and ideas to suggest answers to questions • gathering and recording data to help in answering questions. Working Scientifically' is embedded into each unit. Children will have opportunities to take part in: • Observations over time • Pattern seeking • Identifying, classifying and grouping • Comparative and fair testing • Researching using secondary sources	• All animals have 3 basic needs for survival: water, food and air. • Shelter is also important for animals. • If something is essential, then we need it to survive. • If something is non-essential, we can survive without it. • Animals, including humans, have offspring which grow into adults. • Offspring are very much, but not exactly, like their parents. • Most animal babies need to be fed and cared for by their parents. • Humans need to exercise to be healthy. • Exercise makes your muscles (including your heart) and your bones stronger. • Exercise can make you happier. • We need food to survive. • Food can be sorted into different groups. • We need the right amount of different types of food to be healthy. • Food can be sorted into different groups. • We need the right amount of different types of food to be healthy	• (animal baby names) • adult • artery • baby • balanced diet • basic needs • beats per minute (bpm) • bones • calcium • carbohydrates • child • dairy • dehydration • energy • essential • exercise • fats and sugars • fibre • fruits and vegetables • germs (microbes) • heart • heart rate • hygiene • life cycle • muscles • non-essential • nutrients • offspring • oxygen • protein • pulse • shelter • spread • survive • teenager • toddler • vein • vitamins and minerals

				• Hygiene is the practice of keeping yourself and your environment clean in order to maintain health. • Staying clean is important as it keeps you healthy. • Germs are tiny living things that can creep into our bodies and make us unwell. • Germs can be spread easily. • Washing your hands well is the best way to stop germs from spreading.	
Autumn 2 Uses of Materials (Chemistry)	**Scope:** In Year 2, pupils identify and compare the suitability of a variety of everyday materials. They also find out how the shapes of solid objects, made from some materials, can be changed. **Sequence:** This unit is designed to expand pupils' knowledge of materials and what they are used for. It builds on what pupils learnt in Year 1. The first session is a revision session of the work completed in Year 1, designed to remind pupils of the names of common materials and their properties. This unit is deliberately placed alongside the History unit 'The Great Fire of London' so that links can be made between the two subjects.	• the materials different objects are made from • how materials are used in their local area • gather and use data to compare the suitability of different materials perform simple tests to explore how the shapes of objects made from some materials can be changed • suggest ways to stop plastic pollution • understand how new materials have been/are discovered	Working Scientifically Key Stage 1: • asking simple questions and recognising that they can be answered in different ways • observing closely, using simple equipment • performing simple tests identifying and classifying using their observations and ideas to suggest answers to questions • gathering and recording data to help in answering questions. Working Scientifically' is embedded into each unit. Children will have opportunities to take part in: • Observations over time • Pattern seeking • Identifying, classifying and grouping • Comparative and fair testing • Researching using secondary sources	• Materials are used to make objects. • The same materials are used to make lots of different objects (e.g. metal can be used to make coins, cans and cars). • Different materials are used for the same object (e.g. spoons can be made from plastic, wood and metal) • Different materials have different properties. • A material is chosen to make an object because of its properties. • Materials are used to make objects. • The same materials are used to make lots of different objects (e.g. metal can be used to make coins, cans and cars). • Different materials are used for the same object (e.g. spoons can be made from plastic, wood and metal)	• absorbent • bend • biodegradable • bulletproof • crops • discover • fabric • flexible • glass • invention • inventor • Kevlar • litter • materials • metal • objects • opaque • packaging • paper • plastic • pledge • pollution • properties • recycle • rigid • rock • rubber • scientist • shape • silicon chip

				• Different materials have different properties. • A material is chosen to make an object because of its properties. • Different materials have different properties. • A material is chosen to make an object because of its properties. • The properties of a material make it either suitable or unsuitable. • Some materials are more suitable than others. • Objects that can be squashed, bent, twisted or stretched are all made from flexible materials. • Flexible materials can change shape. • Objects that cannot be squashed, bent, twisted or stretched are all made from rigid materials. • Rigid materials cannot change shape. • Both flexible and rigid materials are important and used for different things. • Recycling is when materials can be reused and made into new items. • Plastic is non-biodegradable and not all plastic can be recycled. • There are special symbols on packaging to tell you if something can be recycled. • Lots of plastic ends up in the ocean. • Animals can be hurt by plastic, especially if they	• single-use • squash • stretch • suitability • suitable • symbols • transparent • twist • unsuitable • water • waterproof • wood

				mistake it for food and eat it. • Throughout history, materials have changed the way that humans live. • George Washington Carver invented new uses for the peanut, which helped struggling farmers to make a living. • Stephanie Kwolek discovered a new material called Kevlar which has saved thousands of lives. • Charles Macintosh invented the first waterproof fabric to keep people dry in the rain.	
Spring 1 and Spring 2 Habitats (Biology)	**Scope:** In Year 2, pupils are taught the difference between things that are living, dead and things that have never been alive. They are also taught that most organisms live within habitats, that the organisms within an environment are suited to life there and that they depend on each other. Pupils are then able construct simple food chains in addition to identifying and classifying organisms within habitats. **Sequence:** This unit is designed to expand pupils' knowledge of living things. In Year 1, pupils discovered the different types of vertebrates: fish, mammals, birds, reptiles and amphibians and that animals can be classified as carnivores, herbivores or omnivores. They also investigated what animals need to survive. This unit builds upon that knowledge with habitats and food chains. This unit is deliberately placed alongside the geography unit 'Planet Earth' so that links can be made between the two subjects.	• recognise and classify objects and organisms as: alive, dead, or never alive • explore how we know if an object or organism is alive – using the life processes • know some of the different habitats plants are found in • investigate and name the minibeasts found in a range of different microhabitats • which animals are found in different world habitats with a focus on the Arctic and the Sahara • understand simple food chains using the vocabulary carnivore, herbivore, omnivore, predator and prey • understand that habitats can change over time	Working Scientifically Key Stage 1: • asking simple questions and recognising that they can be answered in different ways • observing closely, using simple equipment • performing simple tests identifying and classifying using their observations and ideas to suggest answers to questions • gathering and recording data to help in answering questions. Working Scientifically' is embedded into each unit. Children will have opportunities to take part in: • Observations over time • Pattern seeking • Identifying, classifying and grouping	• All objects are either living, dead or have never lived. • Plants and animals are living things. • Dead things are plants and animals that have died. Parts of plants and animals which are no longer attached to the living thing (hair, fur, shells, feathers, leaves) are also dead. • Objects made of rock, metal and plastic have never lived. • There are some things which all living things do. These are called life processes. These are some of them: ○ Movement ○ Respiration ○ Sensitivity ○ Growth	• Arctic • attached • basic needs • carnivore • coast • compost • dead • decaying • desert • farmland • fennec fox/ scorpion • food chain • growth • habitat • herbivore • is eaten by • life processes • living • microhabitat • minibeasts • movement • needs • never lived

			• Comparative and fair testing • Researching using secondary sources	○ Nutrition • All living things live in places which meet their needs. These places are called habitats. • Animals live in habitats where they can find food, water and shelter. Plants live in habitats where they can grow. Different habitats meet the needs of different plants and animals. • A habitat is not the same as a home. • Habitats in the UK include urban (towns and cities), woodland, the coast (by the sea), farmland and ponds. • Habitats can be very big or very small. Very small habitats are called microhabitats. • Different microhabitats meet the needs of different animals and plants. We can find minibeasts in microhabitats. • Different habitats meet the needs of different plants and animals. • Earthworms mostly live underground. • Dark, damp, underground habitats meet the basic needs of earthworms. • The Arctic is a polar habitat. The north pole is in the Arctic. (Antarctica is also a polar habitat. It is	• nutrition • omnivore • polar • polar bear/ arctic fox • ponds • predator • prey • respiration • Sahara • season • sensitivity • soil • United Kingdom • urban • woodland • wormery

				the continent around the south pole.) • It is very cold and windy in the Arctic. There is lots of snow and ice. • The Sahara in Africa is a desert habitat. It is very hot in the daytime and can be cold at night. There is very little rain. • Different animals and plants live in the Arctic and the Sahara because they are different habitats. • Plants get their energy from light. • Some animals eat plants (herbivores). Other animals eat animals (carnivores). Some animals eat both plants and animals (omnivores). • Animals which hunt and eat other animals are predators. The animals which they eat are their prey. • The plants and animals in a habitat are linked in 'food chains'. • The arrow in a food chain means 'is eaten by'. • The plants and animals in a habitat are linked by 'food chains'. • The first part of a food chain is always a plant. • There can be more than two parts of a food chain. • Habitats in the United Kingdom change in	

				different seasons. • We can see different plants and animals in a habitat in different seasons • You may find different plants now in the habitat you surveyed in lesson 3. • All living things share the same life processes. • Movement, respiration, sensitivity, growth and nutrition are some of these. • Worms live in dark, damp, underground habitats. These habitats meet their basic needs for food, water and shelter. • Worms eat dead leaves and other parts of plants and soil. • Worms form part of the food chain.	
Summer 1 Protecting Our Environment (Biology)	**Scope:** The National Curriculum does not require pupils to explore the human impact on the environment until Year 4 but within AC+ Science, pupils will first be introduced to this concept here in Year 2. This ensures that pupils have the necessary foundational knowledge but also that pupils are considering the environment and their role in protecting it. **Sequence:** This unit is designed to expand pupils' subject knowledge of habitats through the lens of how and why habitats should be protected. The content is designed to support pupils in understanding why the environment is important and what they can do to make a difference on a local scale.	• why we need to protect our planet • what we mean by the word 'environment' • why trees are so important for the environment • how habitats can be negatively impacted • how their local environment is being impacted • the different ways in which we can save or conserve water and electricity • how their actions at home could support the	Working Scientifically Key Stage 1: • asking simple questions and recognising that they can be answered in different ways • observing closely, using simple equipment • performing simple tests identifying and classifying using their observations and ideas to suggest answers to questions • gathering and recording data to help in answering questions. Working Scientifically' is embedded into each unit.	• Identify where we live and what is in the immediate environment. • Cities have large amounts of animals living wild. • Pollution is a major problem in cities. • Traffic and housing can destroy habitats for animals. • Humans often see local animals as pests and will destroy them. • Almost everything we do creates waste • Many materials can be reused or mended • Materials that cannot be reused or	• aluminium • carbon dioxide • causes • conserve • dams • danger • deciduous • eco-house • effect • efficient • electricity • energy • environment • environmentally friendly • evergreen • extinct • fossil fuels • fuel • glass

	This unit is placed after the science 'Habitats' unit and the geography 'Planet Earth' unit. This unit is deliberately placed alongside the history unit 'They Made a Difference' so that links can be made between the subjects.	protection of the environment	Children will have opportunities to take part in: • Observations over time • Pattern seeking • Identifying, classifying and grouping • Comparative and fair testing • Researching using secondary sources	mended may be able to be recycled • Recycling is the process of converting waste materials into new materials and objects • Items that cannot be recycled will usually be disposed of in landfill • Some metal, glass, plastic, paper, and card can be recycled • Water has many uses, including, drinking, and bathing • Water is cleaned for reuse. • Cleaning water needs electricity. • Moving water can create energy/electricity. • The amount of water on earth does not change, but the number of people does. • Unclean water can carry disease. • Not all water is drinkable. • Over 70% of the surface of the Earth is covered in water • Everything that lives on the earth needs water to survive. • Electricity is a source of energy made from fossil fuels • There are many sources of renewable energy • Electricity sources are all around us and are used for many different things in everyday life	• habitat • household waste • incineration • issues • landfill • mend • oxygen • paper • pests • planet • plastic • pledge • pollution • promise • recycle • recycling • renewable • reuse • rubbish • rural • sewage • source • timber • urban • waste • wastewater • water • wildlife

				• Being energy efficient has a positive impact on the planet • Trees are habitats to many animals. • Trees provide materials that are used in everyday life • Different types of food come from trees • 70% of the world's oxygen is produced by trees • Trees keep air clean and ecosystems healthy • Trees breathe in carbon dioxide and produce oxygen • Humans need oxygen to stay alive • Everyday activities can be adapted to be more energy efficient. • Being energy efficient helps to protect the environment. • There are many ways that we can be energy efficient with water and electricity • We can recycle, re-use or mend materials. • Humans need to look after trees because they help to keep us alive.	
Summer 2 Plants – Bulbs and Growth (Biology)	**Scope:** In Year 2, pupils are taught to observe and describe how seeds and bulbs mature into plants. Pupils also find out and describe how plants need water, light and a suitable temperature to stay healthy. **Sequence:** Pupils in Year 1 were introduced to common wild and garden plants, including deciduous	• what seeds are and the different types of seeds • that plants can grow from seeds but can also grow from bulbs • what is meant by 'seed dispersal' • what is meant by 'germination' and that seeds need certain conditions to germinate	Working Scientifically Key Stage 1: • asking simple questions and recognising that they can be answered in different ways • observing closely, using simple equipment • performing simple tests identifying and classifying using their observations	• Most plants come from seeds or bulbs. • Each seed or bulb is a whole new plant, just waiting to grow! • Seeds come in all shapes, sizes and colours. • Dissect means to take apart. • You can dissect a seed to see what is inside.	• anchor • baby plant (embryo) • bean seed • bulb • conditions • dispersal • dissect • dormant • expedition • germinate • germination

	and evergreen trees. They also identified and described the basic structure of a variety of common flowering plants, including trees. Earlier in Year 2, pupils added to their knowledge of plants by looking at plants within different habitats, the role plants play in food chains and why trees are important.	• the needs of a plant for survival after the initial germination stage	and ideas to suggest answers to questions • gathering and recording data to help in answering questions. Working Scientifically' is embedded into each unit. Children will have opportunities to take part in: • Observations over time • Pattern seeking • Identifying, classifying and grouping • Comparative and fair testing • Researching using secondary sources	• A seed contains a baby plant (embryo). • A seed is a living thing. • Before a seed starts to grow, it is dormant. • When a seed germinates, it starts to grow. • Germination is the baby plant (embryo) inside a seed waking up and growing. • In order to germinate, the conditions must be right. • After germination, a plant needs certain conditions to grow and survive. • Five conditions for successful growth are: water, light, a suitable temperature, air and time. • As plants are living things, they grow and reproduce like any other living thing. • This process is called a plant life cycle. • The 5 stages in a plant life cycle are: seed, germination, growth, reproduction and dispersal. • Seed packets tell us what seeds need to germinate and grow and how to care for a young growing plant.	• grow • growth • instructions • leaves • life cycle • packet • prediction • reproduction • root • roots • seed • seed coat • seed leaves • seedling • shoot • sprout • stem • sunflower • survive • variables
YEAR 3	**Rationale**	**Key content from NC**	**Skills/Processes**	**Essential Knowledge**	**Vocabulary**
Autumn 1 Skeletons and Muscles (Biology)	**Scope:** In Year 3, pupils are taught to identify that animals, including humans, need the right types and amounts of nutrition and that they cannot make their own food. Pupils are also taught to identify that humans and some animals have skeletons and muscles for support, protection and movement.	• what a human skeleton looks like • what the function of the human skeleton is in terms of movement, support and protection • how bones and muscles work together	Working Scientifically Lower Key Stage 2: During years 3 and 4, pupils should be taught to use the following practical scientific methods, processes and skills: • asking relevant questions and using different types	• The human skeleton is a framework of bones. • Some parts of our bodies are also made from cartilage. • There are 206 bones in the skeleton of an adult human.	• (common bone names) • (scientific bone names) • balanced • ball and socket joint • bone • carbohydrates • cardiac • carnivore

	Sequence: In Year 1, pupils learnt how to identify a range of different common animals – they should be able to describe the structure of a range of different vertebrate and identify and label basic parts of the human body. Pupils know that animals can be classified as carnivores, herbivores and omnivores. In Year 2 pupils found out that animals obtain their food from plants and other animals – they also looked at and learnt to read simple food chains.	• the different types of muscle found within our bodies • how skeletons vary between different animals – endoskeletons, exoskeletons and hydrostatic skeletons • what nutrition is and how it is obtained through eating different food groups • how different animals get the nutrition they need	of scientific enquiries to answer them • setting up simple practical enquiries, comparative and fair tests making systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers • gathering, recording, classifying and presenting data in a variety of ways to help in answering questions recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions • using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions • identifying differences, similarities or changes related to simple scientific ideas and processes • using straightforward scientific evidence to answer questions or to support their findings.	• There are common names for the bones in our bodies. • There are scientific names for those same bones. • We can use our knowledge of bones to label and describe the skeleton. • The human skeleton has three main functions • To support our bodies • To protect vital organs • To allow movement of the body • Different bones can have more than one function • Bones meet at joints and joints allow movement • There are four main types of joint • We have three different types of muscle in our bodies: cardiac muscle, smooth muscle and skeletal muscle. • Each type of muscle has a different function. • Muscles can have voluntary or involuntary movements. • Skeletal muscles work with our bones to allow us to move. • Bones are joined together with ligaments. • The ends of bones are covered in cartilage. • Muscles are joined to bones with tendons. • A vertebrate is an animal with a vertebral column. • An invertebrate is an animal without a vertebral column.	• cartilage • diet • endoskeleton • exoskeleton • fibre • food chain • herbivore • hinge joint • human • invertebrate • involuntary • ligament • minerals • movement • muscle • nutrition • omnivore • organs • photosynthesis • pivot joint • protection • proteins • skeletal muscle • skeleton • smooth muscle • support • tendon • vertebrate • vitamins • voluntary

			Working Scientifically' is embedded into each unit. Children will have opportunities to take part in: • Observations over time • Pattern seeking • Identifying, classifying and grouping • Comparative and fair testing • Researching using secondary sources	• Vertebrates have an endoskeleton. • An endoskeleton is found inside the body. • An exoskeleton is found outside of the body. • Nutrition is the process of providing our body with what it needs. • Plants can make their own food but humans and animals cannot. • We need to eat to give our body what it needs. • Bodies need: Carbohydrates, proteins, fats, vitamins, minerals and fibre. • We need to eat a range of different foods in order to do this. • When we eat the right amount of each food group we say our diet is balanced. • Animals, like humans cannot make their own food. • Food chains show what animals eat. • All food chains begin with a green plant. • Animals which eat only plants are herbivores. • Animals which eat only other animals are carnivores. • Animals which eat both plants and other animals are omnivores.	
Autumn 2 Rocks and Fossils (Chemistry)	**Scope:** In Year 3, pupils are taught to compare, and group together different kinds of rocks based on their appearance and simple physical properties. Pupils also learn to	• what rocks are and how they can be classified as either sedimentary, igneous or metamorphic	Working Scientifically Lower Key Stage 2: During years 3 and 4, pupils should be taught to use the	• The Earth's crust is made of rock • The mantle underneath is mostly molten rock	• absorption • anthropic • bone fossil • building • burns

	describe how fossils form and that soils are made from rocks and organic matter. **Sequence:** This unit follows on from the Year 1 and Year 2 'Materials' units. Pupils know how to identify, sort and classify materials based on their properties. They also know that the properties of materials are why certain materials are chosen for a specific purpose and that some properties cannot be identified without investigating the material in question. Pupils apply this knowledge to support them in understanding rocks, fossils and soils. This unit is deliberately placed alongside the 'Stone Age' history unit so links can be made between subjects.	• the properties of different types of rocks – in particular, durability and permeability • how different rocks can be used and how those uses are based upon their properties • what fossils are and what they can tell us about the past • who Mary Anning was • the process of fossilisation and the different types of fossil • what soil is, what soil is made from and whether all soils are the same	following practical scientific methods, processes and skills: • asking relevant questions and using different types of scientific enquiries to answer them • setting up simple practical enquiries, comparative and fair tests making systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers • gathering, recording, classifying and presenting data in a variety of ways to help in answering questions recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions • using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions • identifying differences, similarities or changes related to simple scientific ideas and processes	• Rocks are all across the surface of the Earth • Rocks can be natural or man-made • There are three types of rock: sedimentary, igneous and metamorphic • Each type of rock is formed in a different way • Some rocks are more durable than others • Durable means hard-wearing • Erosion wears rocks away • Some rocks allow water or air to pass through them • Permeable means to let water or air pass through • Different rocks have different properties • Those different properties mean that rocks have different uses • Different rocks are used for different purposes • We can research both the properties and uses of different types of rock • Fossils are the shape of or remains of a plant or animal • Fossils are found in rocks and other natural materials • They can help is to find out about the organisms that lived in the past • A palaeontologist searches for and investigates fossils • Mary Anning is known as an early fossil hunter • Her findings hugely supported our	• carve • crystals • decay • decompose • dissolve • durable • earth • erosion • extinct • fossil • fossilisation • friction • grains • igneous • impermeable • metamorphic • minerals • mold fossil • molten • natural • organism • origin • palaeontologist • paleontology • permeable • polished • porous • properties • remains • resin fossil • rock segments • rocks • sculpture • sediment • sedimentary • soil • submerge • tourists • trace fossil • uses

			• using straightforward scientific evidence to answer questions or to support their findings. Working Scientifically' is embedded into each unit. Children will have opportunities to take part in: • Observations over time • Pattern seeking • Identifying, classifying and grouping • Comparative and fair testing • Researching using secondary sources	understanding that animals can become extinct • Most animals and plants do not become fossils when they die • Most fossils only occur in sedimentary rock • These fossils are a result of bones dissolving and the shape being replaced by minerals • The depth a fossil is found within rock can help us to work out how old that fossil is • There are also other types of fossils • Soil is made up of small bits or grains of rock • The small bits of rock combine with decaying living things • This is mostly decaying plants • There are different types of soil • The type of soil depends on the type of rock from which it is formed • Different types of soil absorb different amounts of water	
Spring 1 and Spring 2 Light and Shadows (Physics)	**Scope:** In Year 3, pupils are taught to recognise that they need light to see things and that dark is the absence of light. They are also taught to notice that light is reflected from surfaces, to recognise that light from the sun can be dangerous and that there are ways we can protect our eyes from the sun. In addition, pupils are taught to recognise that shadows are formed when the light from a light source is blocked by an opaque	• there are different sources of light and those sources can be natural or man-made • who Thomas Edison was and why he is considered significant • darkness is the absence of light and light allows us to see things • light is reflected from surfaces	Working Scientifically Lower Key Stage 2: During years 3 and 4, pupils should be taught to use the following practical scientific methods, processes and skills: • asking relevant questions and using different types of scientific enquiries to answer them • setting up simple practical enquiries, comparative and	• Objects that give out light are called sources of light • Light travels from a source • Sources of light vary in brightness • Light sources can be natural or man-made • Darkness is the lack of light • Light shines from the Sun onto Earth • Earth spins every 24 hours	• angle • brighter • closer • concave mirror • convex mirror • direct line of sight • faint • famous • formed • inventor • lightbulb • man-made

	object and to find patterns in the way that shadows change. **Sequence:** This is first time pupils have looked at light since Year 1 and they know that the hours of daylight change throughout the year, depending on the season. Pupils also studied materials in Year 1 and Year 2: the properties and uses of them. Earlier in Year 3, pupils looked at whether certain materials were magnetic and within this unit they will investigate a new property – whether certain materials are transparent, translucent or opaque. This means the knowledge within this unit is also building pupils' knowledge of materials (chemistry).	• some objects are opaque, some are transparent, and some are translucent • shadows are formed when light is blocked by an opaque object • position, shape and size of a shadow can be varied • light is dangerous and we can take steps to protecting our ourselves from the Sun • the different uses of mirrors	fair tests making systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers • gathering, recording, classifying and presenting data in a variety of ways to help in answering questions recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions • using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions • identifying differences, similarities or changes related to simple scientific ideas and processes • using straightforward scientific evidence to answer questions or to support their findings. Working Scientifically' is embedded into each unit. Children will have opportunities to take part in:	• The turning of the Earth makes the sun appear to move across the sky • When the sun shines on us, it is daytime • When the sun is not shining on us, it is night • Sunlight is needed to produce vitamin D • Staring directly at the sun damages the eyes • UVA rays can result in sunburn, aging and illness • Appropriate clothing is needed to protect from the sun • Direct sunlight should be avoided at the hottest points in the day • Light travels in a straight line. • When looking at a light source, the light travels straight into our eye • When seeing an object, it travels onto the object and reflects into our eye • When light hits an object, it is reflected (bounces off). • If the reflected light hits our eyes, we can see the object. • Some materials are more reflective than others. • Non-reflective material is dark and dull • Reflective material is smooth and shiny • Transparent – allows all light to pass through it • Opaque – allows no light to pass through it	• mirrors • opaque • periscope • phonograph • plane mirror • reflection • shadow • source of light • sundial • translucent • transparent

			• Observations over time • Pattern seeking • Identifying, classifying and grouping • Comparative and fair testing • Researching using secondary sources	• Translucent – allows some light to pass through it • Plane mirrors produce an almost exact reflection • Concave mirrors produce larger images • Convex mirrors make the image smaller and can see a wider area • Periscopes are used for observation • They are used when there is no direct line of sight • A periscope uses two mirrors • Mirrors reflect light from the object to the eye • Shadows are formed when light is blocked by an object • Shadows are areas of darkness • Opaque objects form the clearest and darkest shadows • Translucent objects form no shadows • Transparent objects form faint, blurred shadows • The lower the angle of the light source, the longer the shadow that is formed • The closer the object is to a light source – the wider the shadow becomes • A brighter light source forms a clearer, more defined shadow • Sundials use shadows to tell the time of day • Thomas Edison was a famous inventor	

				• He was interested in science and experiments from a young age • He found it difficult to concentrate at school • He often improved the inventions of others • He invented the lightbulb we use today	
Summer 1 Plants – Needs for Survival (Biology)	**Scope:** In Year 3, pupils should be taught to identify and describe the functions of the different parts of flowering plants and that pupils should be taught to explore the requirements of plants for life and growth and investigate the way in which water is transported in plants. The National Curriculum also states that pupils should explore the part that flowers play in the life cycle of flowering plants. **Sequence:** This unit builds on the previous plant units in Year 1 and Year 2. In Year 1 pupils were taught to identify and name a variety of common wild and garden plants and to identify and describe the basic structure of a variety of common flowering plants. Pupils examined familiar plants, identified them, grouped them and were able to draw diagrams showing the parts of different plants and trees. They know how plants change over time – that leaves fall off trees and buds appear and open. In Year 2, pupils identified a variety of plants in their habitats and described their basic needs. They also found out that plants play an important part in a food chain. Pupils observed and described how seeds and bulbs grow into mature plants and found out that plants need water, light and a suitable temperature to grow healthily. This unit has been deliberately placed alongside the geography 'Biomes and Climate Zones' unit	• what a plant needs to grow • the impact of fertiliser on a growing plant • plants have roots to absorb water and nutrients but also to anchor the plant in the ground • plants have a stem as it is needed to support the plant and transport water from the roots • plants have leaves because they play an important part in how a plant produces its own food • that flowering plants produce flowers as an important part of their lifecycle • the stages in the lifecycle of a flowering plant	Working Scientifically Lower Key Stage 2: During years 3 and 4, pupils should be taught to use the following practical scientific methods, processes and skills: • asking relevant questions and using different types of scientific enquiries to answer them • setting up simple practical enquiries, comparative and fair tests making systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers • gathering, recording, classifying and presenting data in a variety of ways to help in answering questions recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables reporting on findings from enquiries, including oral and written explanations,	• All plants need five things for life: light, water, air, nutrients and room to grow. • Plants can grow in many different places, inside and outside. • Plants have roots for specific reasons. • Roots are integral to the survival of a plant. • Roots anchor a plant into the ground. • Roots absorb water and nutrients. • Roots can adapt to their environment. • A stem transports water from the roots. • A stem supports the plant. • A stem is integral to the survival of a plant. • Plants can produce their own food using their leaves. • This process is called photosynthesis. • There are many different parts to a flower. • Flowers have male and female parts • Flowers are an important part of plant reproduction. • There are five stages in the life cycle of a plant:	• absorb • adapt • anchor • anther • bean • carpel • distributed • environment • fertilisation • fertilizer • flowering • food • germination • life cycle • light • nutrients • ovary • photosynthesis • pollination • roots • seed dispersal • seed formation • sepal • stamen • stem • support • survival • water transportation

	so that links can be made between the subjects.		displays or presentations of results and conclusions • using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions • identifying differences, similarities or changes related to simple scientific ideas and processes • using straightforward scientific evidence to answer questions or to support their findings. Working Scientifically' is embedded into each unit. Children will have opportunities to take part in: • Observations over time • Pattern seeking • Identifying, classifying and grouping • Comparative and fair testing • Researching using secondary sources	germination, growing and flowering, pollination, fertilisation and seed formation and seed dispersal. • There are six main ways of dispersing seeds: wind, water, carried by animals, eaten by animals, explosive and drop and roll.	
Summer 2 Forces and Magnets (Physics)	**Scope:** In Year 3, pupils should be taught to compare how things move on different surfaces and notice that some forces need contact between two objects whilst magnetic forces can act at a distance. Pupils also need to observe how magnets attract or repel each other and attract some materials but not others, and describe magnets as having two poles predicting whether two magnets will attract or repel each other depending on which wat the poles are facing. In addition, pupils should be taught to compare and group together a	• what forces are in terms of pushes and pulls • that gravity and friction are forces • how objects move on different surfaces • what a magnet is and what different magnets look like • that a magnet has two poles • how magnets react to each other	Working Scientifically Lower Key Stage 2: During years 3 and 4, pupils should be taught to use the following practical scientific methods, processes and skills: • asking relevant questions and using different types of scientific enquiries to answer them • setting up simple practical enquiries, comparative and fair tests making systematic and careful	• A force can cause a change in speed, direction or shape. • Some forces are pushes. • Some forces are pulls. • Most forces need two objects to touch to cause a change • Friction is a pushing force. • Friction slows moving objects down. • Gravity is a pulling force. • Gravity speeds things up.	• alloy • Antarctica • Arctic • attract • bar magnet • button magnet • compass • cylindrical magnet • direction • distance • Earth • field • force • friction

	variety of everyday materials based on whether they are attracted to a magnet and to identify some magnetic materials. **Sequence:** This is the second physics unit in Year 3 however it is the first time pupils have studied forces and magnets. This unit does not directly build on a previous unit but is expanding pupils' understanding of how objects can be classified in different ways – expanding their vocabulary with the terms magnetic and non-magnetic. Pupils will not study magnets again in depth during Key Stage 2 but will revisit forces and study them in much more depth in Year 5. This unit has been deliberately placed alongside the history 'Ancient Greeks' unit as the Ancient Greeks are credited as discovering magnetite, a naturally occurring magnetic mineral.	• materials can be magnetic or non-magnetic • how to investigate whether a material is magnetic • how magnets are used in real-life scenarios to make some tasks much easier	observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers • gathering, recording, classifying and presenting data in a variety of ways to help in answering questions recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions • using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions • identifying differences, similarities or changes related to simple scientific ideas and processes • using straightforward scientific evidence to answer questions or to support their findings. Working Scientifically' is embedded into each unit. Children will have opportunities to take part in: • Observations over time • Pattern seeking	• Different surfaces create different amounts of friction. • All magnets have two poles — a north pole and a south pole. • The poles of a magnet are where the magnetic forces are the strongest. • Opposite poles of magnets are attracted to each other. • Like poles of magnets repel each other. • Magnets produce a force which attracts some materials to the magnet. • We say that materials attracted to a magnet are magnetic. • Materials attracted to magnets are often metals. • Not all metal objects are magnetic. • Magnets come in different shapes and sizes. • All magnets attract the same materials even if they look different to each other. • We can investigate the strength of different magnets using magnetic objects. • We use magnets in the real world for many different reasons. • The magnet inside a compass helps people to know the direction they are travelling in. • The magnet inside a fridge keeps the door closed.	• fridge • gravity • horseshoe magnet • investigate • iron • like • magnet • magnetic • magnetised • man-made • material • movement • natural • non-magnetic • north • object • opposite • pointer • pole • pull • push • real-life • record • repel • ring magnet • shape • south • speed • start • steel • stop • strength • surfaces • travel

			• Identifying, classifying and grouping • Comparative and fair testing • Researching using secondary sources	• It may not always be obvious that a magnet is being used.	
YEAR 4	**Rationale**	**Key content from NC**	**Skills/Processes**	**Essential Knowledge**	**Vocabulary**
Autumn 1 Teeth and Digestion (Biology)	**Scope:** In Year 4, pupils should be taught to describe the simple functions of the basic parts of the digestive system in humans and to identify the different types of teeth in humans and their simple functions. **Sequence:** In Year 3, pupils learned about the skeleton, muscles and nutrition. This unit adds a further layer to pupils' knowledge of the human body – human teeth and the human digestive system. In addition to this, across a range of biology units, pupils have learnt about the classification of animals into different groups and they also know what carnivores, herbivores and omnivores are. Pupils also add a further layer to their understanding of animal bodies by discovering the different types of teeth animals have.	• the names of the different types of human teeth and the function of each type • the importance of looking after teeth and what can happen if we do not look after our teeth • how eating and drinking can damage teeth over time • that not all animals have the same teeth • the teeth that animals have greatly depend on whether that animal is a carnivore, an omnivore or an herbivore • the different organs that make up the digestive system • how the digestive system functions as a whole system	Working Scientifically Lower Key Stage 2: During years 3 and 4, pupils should be taught to use the following practical scientific methods, processes and skills: • asking relevant questions and using different types of scientific enquiries to answer them • setting up simple practical enquiries, comparative and fair tests making systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers • gathering, recording, classifying and presenting data in a variety of ways to help in answering questions recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions	• Our teeth are important as they help us to eat • We have two sets of teeth in our lifetime • If we lose our adult teeth, they will not grow back • We have four different types of teeth • The different types of teeth are incisors, canines, premolars and molars • Each type of tooth looks different • Each type of tooth has a different purpose • Our teeth are made of enamel, dentine and pulp. • We must look after our teeth • There are lots of different ways to look after our teeth • Removing plaque from our teeth will prevent decay • If decay sets into our enamel, it becomes difficult to remove • Decay that is not removed will cause further damage • We can and will lose our teeth if we do not look after them • Some foods and drinks can damage our teeth more than others	• acid • adult teeth • canines • carnivore • crown • damage • decay • dentine • digestive system • enamel • gall bladder • herbivore • incisors • intestine • liver • milk teeth • molars • oesophagus • omnivore • pancreas • plaque • premolars • pulp • rectum • root • stomach • sugar • teeth • tooth • wisdom

			• using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions • identifying differences, similarities or changes related to simple scientific ideas and processes • using straightforward scientific evidence to answer questions or to support their findings. Working Scientifically' is embedded into each unit. Children will have opportunities to take part in: • Observations over time • Pattern seeking • Identifying, classifying and grouping • Comparative and fair testing • Researching using secondary sources	• We can still eat and drink the foods that can damage our teeth. • We should try not to eat and drink the foods that can damage our teeth all of the time. • Brushing our teeth can help to limit the damage • Animal teeth all look very different • Carnivores have teeth designed for eating meat • Herbivores have teeth designed for eating plants • Omnivores have teeth designed for eating both meat and plants • Looking at animal teeth can help us to understand what the animal eats • Each of us has a digestive system • Our digestive system breaks food down so that nutrients can be absorbed into our bloodstream • Our digestive systems begin to work as soon as we put food into our mouths • Our digestive system is made up of different parts • Each part of our digestive system has a specific function • Each of us has a digestive system • Our digestive system breaks down food • The food is broken down so that nutrients can be absorbed into our blood stream	

				• Each part of our digestive system has a specific function • We can build and explore a model of the digestive system to help us understand the journey that food takes	
Autumn 2 States of Matter (Chemistry)	**Scope:** In Year 4, pupils should be taught to compare and group materials together, according to whether they are solids, liquids or gases. Pupils should also 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. In addition to this, pupils should identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature. **Sequence:** Pupils have classified and sorted materials according to their properties from EYFS, through Key Stage 1 and in Year 3. For example, pupils have been taught that materials can be hard, soft, shiny, dull, waterproof, absorbent, opaque, transparent, translucent, or magnetic. Pupils have also considered and investigated how the properties of different materials mean that those materials have certain uses. In Year 3, pupils compared and grouped different kind of rocks based on their appearance and physical properties. Through this unit pupils add the terms solid, liquid and gas to their understanding of how objects can be grouped and classified This unit has been placed before the geography unit 'Amazon: Rivers and Rainforests' so that pupils begin that unit with an understanding of the water cycle.	• what the three states of matter are and the properties of each one. • the processes of melting and freezing and how these processes affect the properties and state of a substance • some of the conditions that can affect melting and freezing for example temperature • what the processes of evaporation and condensation are • what the water cycle is • where the processes of evaporation and condensation fit into the water cycle • the importance of the water cycle for plants and animals	Working Scientifically Lower Key Stage 2: During years 3 and 4, pupils should be taught to use the following practical scientific methods, processes and skills: • asking relevant questions and using different types of scientific enquiries to answer them • setting up simple practical enquiries, comparative and fair tests making systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers • gathering, recording, classifying and presenting data in a variety of ways to help in answering questions recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions	• All objects can be classified as either a solid, liquid and a gas. • Solids keep their shape and have a fixed volume. • Liquids have a fixed volume but change shape to fit a container. • Gases have no fixed shape or volume. • Clusters of small solids form a mound when poured. • Freezing is the changing of a state from liquid to a solid. • Liquids freeze as they get cooler. • Water freezes at 0°C. • The thicker the liquid, the longer it takes to freeze. • Melting is a change of state from solid to liquid. • Some solids melt when they get warm. • Not all solids melt. • The material objects are made from is key to their purpose. • Melting is a change of state from solid to liquid. • Some solids melt when they get warm. • The greater the temperature the quicker the change of state.	• Celsius • change of state • condensation • condenses • convert • cycle • degree Celsius • evaporation • freeze • gas • liquid • material • melting • pace • precipitation • rate • solid • states of matter • temperature • viscosity • water vapour

			• using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions • identifying differences, similarities or changes related to simple scientific ideas and processes • using straightforward scientific evidence to answer questions or to support their findings. Working Scientifically' is embedded into each unit. Children will have opportunities to take part in: • Observations over time • Pattern seeking • Identifying, classifying and grouping • Comparative and fair testing • Researching using secondary sources	• The greater the volume the slower the change of state. • Ice melts at 0°C. • Evaporation is the change of state from liquid to gas. • Liquids often boil as they get warmer. • The greater the temperature, the quicker the evaporation of water that will occur. • The greater the volume of water, the slower the pace of evaporation. • Water at the surface of seas, rivers, etc. evaporates into water vapour (a gas). • Condensation is the change of state from gas to liquid. • Water vapour condenses when it comes into contact with a cold surface. • Water at the surface of seas, rivers, etc. evaporates into water vapour (a gas). This rises, cools and condenses back into a liquid forming clouds. • When too much water has condensed the water droplets in the cloud get too heavy and falls back down as precipitation and drains back into rivers, seas and oceans.	
Spring 1 and Spring 2 Classification and Environments (Biology)	**Scope:** In Year 4, pupils should be taught to recognise that living things can be grouped in a variety of ways and to explore and use classification keys to help group, identify and name a variety of living things within their local and wider environment. Pupils	• a habitat is the natural home of an organism • all living organisms display the seven characteristics of life	Working Scientifically Lower Key Stage 2: During years 3 and 4, pupils should be taught to use the following practical scientific methods, processes and skills:	• A habitat is the natural home of a plant or animal. • Several microhabitats can be found within a single habitat. • Animals and plants are known as organisms.	• amphibian • annelid • arachnid • bird • botany • carnivore • characteristics

	should also be taught to recognise that environments can change and that this can sometimes pose dangers to living things. Within this unit, a statement from the Year 4 'animals, including humans' thread is taught alongside the classification of animals within habitats. Pupils are also taught to construct and interpret a variety of food chains, identifying producers, predators and prey. **Sequence:** This is the second biology unit for Year 4. This unit sees pupils revisit habitats and living things. Pupils apply their knowledge of common plants and animals from Year 1, the needs that animals have, food chains and habitats from Year 2 and the needs that plants have and the difference between a vertebrate and an invertebrate from Year 3. Earlier in Year 4, pupils also revisited the idea of carnivores, herbivores, and omnivores. In addition, pupils also bring with them additional knowledge from Year 2: the environment, how environments can change and the ways in which environments can be protected from. This unit has been deliberately placed alongside the 'Amazon: Rivers and Rainforests' unit so that links can be made between the two subjects.	• organisms within a habitat or ecosystem are interdependent • the relationships between organisms can be represented by food chains and food webs • the difference between a vertebrate and an invertebrate • vertebrates can be classified into five different groups • invertebrates can be classified into seven different groups • characteristics of animals supports us with classification • we can use a key to identify and classify animals • plants can be classified as flowering or non-flowering • non-flowering plants can be classified into three groups • who Libbie Hyman was and why she is considered significant • that environments can change due to natural causes and through the actions of humans and that these changes can be both positive and negative • the organisms and habitats found within their own local environment and how these are changing	• asking relevant questions and using different types of scientific enquiries to answer them • setting up simple practical enquiries, comparative and fair tests making systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers • gathering, recording, classifying and presenting data in a variety of ways to help in answering questions recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions • using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions • identifying differences, similarities or changes related to simple scientific ideas and processes • using straightforward scientific evidence to	• All organisms display the seven characteristics of life. • All organisms are suited to live in their natural habitat. • Everything we eat can be traced back to a green plant. • Food chains show the connections and movement of energy within a single ecosystem. • Food chains show how organisms depend on each other for survival. • Multiple food chains can be shown together in a food web. • Vertebrates are animals with a backbone. • Mammals are a type of vertebrate. • Reptiles are a type of vertebrate. • Fish are a type of vertebrate. • Birds are a type of vertebrate. • Amphibians are a type of vertebrate. • Animals without a backbone are called invertebrate. • Insects are a type of invertebrate. • Crustaceans are a type of invertebrate. • Echinoderms are a type of invertebrate. • Annelids are a type of invertebrate. • Arachnids are a type of invertebrate.	• class • classification • classification key • conifers • consumer • crustacean • deforestation • depend • echinoderm • ecosystem • environment • ferns • fish • flowering • food chain • food web • grasses • habitat • herbivore • identify • impact • insects • invertebrate • local • mammal • microhabitat • mollusc • mosses • natural/human • nature reserve • negative • non-flowering • omnivore • organism • pollution • positive • positive/negative • predator • prey • producer • protect • protozoa • reptile • species

			answer questions or to support their findings. Working Scientifically' is embedded into each unit. Children will have opportunities to take part in: • Observations over time • Pattern seeking • Identifying, classifying and grouping • Comparative and fair testing • Researching using secondary sources	• Molluscs are a type of invertebrate. • Protozoa are a type of invertebrate. • Animals have characteristics which make them the same, similar or different. • A species is a group of animals with similar characteristics. • Different species can belong to the same class of animal. • We can use characteristics to help us to identify and classify animals. • We can classify plants as flowering plants. • We can classify plants as non-flowering plants. • Flowering plants include grasses. • Non-flowering plants include ferns, mosses and conifers. • Libbie Hyman was a scientist who had been fascinated by classification from a young age. • She studied animals and plants and wrote books about vertebrate and invertebrate. • Carl Linnaeus was botanist, physician and zoologist who created two scientific systems for classifying plants animals and for naming all living things. • An environment can change because of something natural.	• urbanisation • vertebrate • zoology

				• An environment can change because of the actions of humans. • A change can be positive for the environment. • A change can be negative for the environment. • There are many different habitats in our local environment. • There are many different ecosystems in our local environment. • There will be different organisms in our local environment. • We can create a classification key to identify what we see in our local environment. • Environmental changes are happening in our local environment. • Some changes will have a negative impact on our local environment. • Some changes will have a positive impact on our local environment. • We should protect the organisms in our local environment. • We can do more to protect those organisms.	
Summer 1 Sound (Physics)	**Scope:** In Year 4, pupils should be taught to identify how sounds are made, associating some of them with something vibrating and to recognise that vibrations from sounds travel through a medium to the ear. Pupils should also be taught to find patterns between the pitch of a sound and features of the object that made it in addition to finding patterns between the volume of a	• sound is a form of energy which is produced when something vibrates • different instruments make sound in different ways • sound travels in waves • how sound travels through solids, liquids and gases	Working Scientifically Lower Key Stage 2: During years 3 and 4, pupils should be taught to use the following practical scientific methods, processes and skills: • asking relevant questions and using different types of scientific enquiries to answer them	• Sound is a type of energy. • All sound is made when something vibrates. • We can make a sound because our vocal cords are able to vibrate. • Different instruments make sounds in different ways.	• absorb • amplitude • anvil • auditory nerve • closer • cochlea • decreasing • distance • ear canal • ear drum

	sound and the strength of the vibrations that produced it. Pupils should also be taught to recognise that sounds get fainter as the distance from the sound source increases. **Sequence:** This is the first time that pupils have studied sound in science and will be the only time they study sound in science in both Key Stage 1 and Key Stage 2. Previous knowledge that this unit builds upon is that of solids, liquids and gases, Pupils discovered the difference between solids, liquids and gases earlier in Year 4 and within this unit, they find out how sound can travel through them. Understanding the formation of matter within each will support pupils in accessing this content. This unit also builds on pupils' knowledge of the human body and how it works – in particular their knowledge of one of the five senses – hearing. In addition, this unit will link to pupils' work within music and from this subject, pupils may bring with them an understanding of the terms pitch and volume as well as an understanding of how instruments produce sounds.	• what makes up the inside of our ears • how we hear and how we can protect our hearing • volume is the intensity of sound and is determined by the strength of vibrations • pitch is how high or low a sound is and is controlled by the speed of vibrations • the distance we are from a sound impacts the volume at which we hear the sound	• setting up simple practical enquiries, comparative and fair tests making systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers • gathering, recording, classifying and presenting data in a variety of ways to help in answering questions recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions • using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions • identifying differences, similarities or changes related to simple scientific ideas and processes • using straightforward scientific evidence to answer questions or to support their findings. Working Scientifically' is embedded into each unit.	• Different parts of instruments vibrate to make sounds. • Sound travels in waves. • Sound waves are vibrating particles. • Sound can travel through solids. • Sounds can travel through liquids. • Solids, liquids and gases are all made up of particles. • Our ears allow us to hear things. • Ears are made up of many different parts. • Sound waves travel through the different parts of our ear before they reach our brain. • It is important to protect our hearing. • We can protect our hearing by absorbing unwanted sound. • Volume means how loud or quiet a sound is. • Different sized vibrations produce sounds of different volumes. • Larger vibrations produce a sound with a greater volume. • Smaller vibrations produce a sound with a lesser volume. • The size of a vibration is called the amplitude. • Pitch is a word that can be used to describe sounds. • Pitch is how high or low a sound is.	• energy • fainter • faster • flautist • flute • force • frequency • further • gas • guitar • guitarist • hammer • high • increasing • larger • length • liquid • loud • low • musical instruments • particles • pinna • pitch • protect • quiet • slower • smaller • solid • sound • source • speed • stirrup • strength • strings • travel • tuning fork • vibrate • vibration • violin • violinist • vocal cords • volume • wave

			Children will have opportunities to take part in: • Observations over time • Pattern seeking • Identifying, classifying and grouping • Comparative and fair testing • Researching using secondary sources	• Pitch is determined by the speed or frequency of the vibrations. • Faster vibrations produce a higher pitch. • Slower vibrations produce a lower pitch. • Distance describes the length of space between two different points. • The distance between two objects increases as they move further away from each other. • The distance between two objects decreases as they move closer to each other. • Sounds appear to fade as we move further away from the source.	
Summer 2 Electricity (Physics)	**Scope:** In Year 4, pupils should be taught to identify common appliances that run on electricity. It states that they should also be taught to construct a simple series electrical circuit, identifying, and naming its basic parts, including cells, wires, bulbs, switches and buzzers. Pupils should also be able to 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, and to recognise that a switch opens and closes a circuit whilst associating this with whether or not a lamp lights in a simple series circuit. In addition, pupils should be taught to recognise some common conductors and insulators and to associate metals with being good conductors. **Sequence:** This unit is the first time pupils study electricity however, prior to this unit, pupils have studied two other forms of energy:	• electricity is a form of energy which powers many things we use everyday • an electric current is a flowing charge of electricity • there are renewable and non-renewable methods of producing electricity • some appliances use electricity and others do not • it is important to be safe and sensible around electricity • what a circuit is and which components are needed to construct a circuit • the difference between a complete and incomplete circuit • how the brightness of a bulb can change within a circuit	Working Scientifically Lower Key Stage 2: During years 3 and 4, pupils should be taught to use the following practical scientific methods, processes and skills: • asking relevant questions and using different types of scientific enquiries to answer them • setting up simple practical enquiries, comparative and fair tests making systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers • gathering, recording, classifying and presenting data in a variety of ways	• Electricity is a type of energy and powers many things we use every day • An appliance is a piece of equipment we use to complete a task. Some use electricity and others do not • Those appliances which use electricity will either be mains powered or battery powered • Mains powered appliances need to be plugged in • Battery powered appliances need certain batteries • We should always act safely and sensibly around electricity NC – WORKING SCIENTIFICALLY	• appliance • battery • battery powered • break • brighter • buzzer • circuit • complete • component • conductor • conducts • dimmer • electrical • electricity • energy • incomplete • insulates • insulator • light • light bulb • mains powered • material • motor • pass through

	light and sound. This unit therefore adds to their understanding of different forms of energy including how they are formed or produced, how they travel and how they behave. The knowledge in this unit also builds on pupils' understanding of the properties of materials and the different ways that materials can be grouped or classified – adding the terms conductor and insulator to pupils' vocabularies.	• the function of a simple switch within a circuit • which materials are conductors and insulators of electricity and how to investigate this property	to help in answering questions recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions • using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions • identifying differences, similarities or changes related to simple scientific ideas and processes • using straightforward scientific evidence to answer questions or to support their findings. Working Scientifically' is embedded into each unit. Children will have opportunities to take part in: • Observations over time • Pattern seeking • Identifying, classifying and grouping • Comparative and fair testing • Researching using secondary sources	Identifying, classifying and grouping (gathering, recording, classifying and presenting data) • A circuit allows electricity to flow • A circuit needs a power source • A circuit needs wires • A circuit powers items such as a bulb, buzzer and a motor • The items powered in a circuit are called components NC – WORKING SCIENTIFICALLY Identifying (recording findings using simple scientific language, drawings, labelled diagrams) • A complete circuit allows electricity to flow around the circuit to power components • A complete circuit has no gaps in the circuit that would stop the flow of electricity • A circuit needs to be complete, or the component will not be powered • The opposite of a complete circuit is an incomplete circuit NC WORKING SCIENTIFICALLY - Identifying, classifying and grouping (using straightforward scientific evidence to answer questions, recording findings using simple scientific language and using results to draw simple conclusions and make predictions for new values)	• power • power source • switch • wire

				• A lightbulb changes electricity into light energy • The amount of light energy given out by a bulb can be described as the brightness of the bulb • If a bulb gives out more light, we would say it is brighter • If a bulb gives out less light, we would say it is dimmer • Adding additional bulbs to a circuit would cause all of the bulbs to become dimmer • Adding additional batteries to a circuit would cause a single bulb to become brighter NC – WORKING SCIENTIFICALLY - Pattern seeking (using straightforward scientific evidence to answer questions, reporting on findings from enquires, including oral and written explanations of results and conclusions) • A switch can be used to complete or break a circuit • It can be turned on and off • When a switch is turned on the circuit is complete • When a switch is turned off the circuit is incomplete NC – WORKING SCIENTIFICALLY - Observing over time (making systematic and careful observations, using results to draw simple	

				conclusions and make predictions for new values) • Different materials have different properties • A material can also be a conductor or an insulator of electricity • A conductor allows an electrical current to pass through it • An insulator does not allow an electrical current to pass through it • Adding a material to a circuit can tell us whether it is a conductor or an insulator of electricity. NC – WORKING SCIENTIFICALLY Comparative tests (setting up simple practical comparative tests, recording findings, reporting on findings from enquiries including oral and written explanations of results and conclusions)	
YEAR 5	**Rationale**	**Key content from NC**	**Skills/Processes**	**Essential Knowledge**	**Vocabulary**
Autumn 1 Earth and Space (Physics)	**Scope:** In Year 5, pupils should be taught to describe the movement of the Earth and other planets relative to the sun in the solar system. They should also be taught to describe the movement of the moon relative to the Earth and describe the sun, Earth and moon as approximately spherical bodies. In addition, they should be taught to use the idea of the Earth's rotation to explain why we experience day and night and why the sun appears to move across the sky during the day. **Sequence:**	• what a sun is, what a solar system is, what a galaxy is and how our own solar system fits in to the wider universe • which planets make up our own solar system • knowledge of the inner and outer planets of the solar system including order, size, what the planet consists of, atmosphere, temperature, rotation and orbit • what the relationship is between the Earth and	Working Scientifically Upper Key Stage 2: During years 5 and 6, pupils should be taught to use the following practical scientific methods, processes and skills: • planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary • taking measurements, using a range of scientific equipment, with increasing accuracy and precision,	• The universe is everything: objects, energy and space • The universe is so huge it is impossible to imagine • There are billions of galaxies in the universe • A galaxy is a collection of billions of stars • A star is a ball of burning gas • The Sun is the nearest star to Earth • Earth is in a galaxy called the Milky Way • Earth is one part of a whole Solar System	• (names of planets) • asteroid belt • atmosphere • axis • climate conditions • crater • crescent • daylight • daylight hours • daytime • earth • equator • flat earth • full moon • galaxy • gas planets

	This unit is the only required unit of study focussed on Earth and space in primary school. Pupils may have studied space in EYFS but aside from this, the links to previous learning are in Year 1 when pupils study seasons and in Year 3 pupils study light in science and biomes and climate zones in geography. From Year 1, pupils bring with them an understanding that here in the United Kingdom we experience four different seasons across the year and that the average hours of daylight change across the year. From Year 3, pupils bring with them a simple understanding of why we have night and day and how shadows change across the course of a day. From the geography unit, pupils have an understanding that the same four seasons are not experienced everywhere across the world. The next unit in Year 5 will look at forces and in particular, gravity. This unit will support pupils in accessing that future content.	the sun in relation to night and day • what a time zone is and how the different time zones are arranged across the world • what the relationship is between the Earth and the sun in relation to seasons • how daylight hours change across the year in different places across the world • what a moon is and what the phases of our own moon are • the heliocentric and geocentric theories of the solar system • the flat and spherical Earth theories • the views of various astronomers over time: Aristotle, Ptolemy, Alhazen, Tusi, Copernicus and Galileo	taking repeat readings when appropriate • recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs • using test results to make predictions to set up further comparative and fair tests • reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations • identifying scientific evidence that has been used to support or refute ideas or arguments.	• The Earth and the Sun can be described as being 'approximately spherical bodies' • It takes the Earth 365 days to orbit the Sun — this is one year • The Earth rotates on an axis • The Earth takes 24 hours to rotate once — this is one day • When parts of the Earth are facing the Sun it is their daytime • Parts of Earth facing away from the Sun experience night-time • The Earth is split into 24 different time zones • In the United Kingdom there are four seasons: autumn, winter, spring and summer • Seasons are caused by the Earth orbiting the Sun on its axis • The seasons in the northern hemisphere are opposite to the seasons in the southern hemisphere • Places near to and along the equator do not have as varied seasonal changes • Seasonal changes include changes in daylight hours • These changes in daylight hours are impacted by the position of a place on Earth • A moon is a body which orbits another body • The body a moon orbits needs to already be orbiting the Sun	• geocentric • gibbous • heliocentric • inner planets • lunar eclipse • lunar month • milky way • moon • mythology • new moon • night-time • northern hemisphere • orbit • outer planets • phases of the moon • planets • prime meridian • rocky planets • rotate • solar system • southern hemisphere • spherical body • spherical earth • star • sun • theory • tilt • time zone • universe • volcano • waning • waxing

				• The Moon can be described as an approximately spherical body • The Moon takes 28 days to orbit the Earth • The Moon appears to change shape in the sky each night • The Moon is not changing shape, it is our view of the Moon from Earth that is changing • We call the changes the phases of the Moon • There are four inner planets: Mercury, Venus, Earth, Mars • The inner planets are all rocky planets • The inner planets are separated from the outer planets by an asteroid belt • There are four outer planets • The outer planets are all gas planets • All of the planets are different and have their own characteristics • Humans have had many theories about the structure of Earth and the Solar System • People used to believe that the Earth was flat — some people still believe this • People used to believe that the Earth was at the centre of the Solar System: this is called the geocentric view • People now believe that the Sun is at the centre of the	

				Solar System: this is called the heliocentric view	
Autumn 2 Forces (Physics)	**Scope:** In Year 5, pupils should be taught to explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object. They should also be taught to identify the effects of air resistance, water resistance and friction, that act between moving surfaces and recognise that some mechanisms including levers, pulleys and gears allow a smaller force to have a greater effect. **Sequence:** Pupils were first introduced to forces in Year 3 where they learned about forces as pushes and pulls and were introduced to both gravity and friction in the simplest terms. Pupils were also introduced to magnets and magnetism as a force. This unit does not cover magnets in any depth however pupils already know what magnets are, that they have two poles, how they behave towards each other, that magnetism can act without contact and that some materials are magnetic whilst others are not. Pupils also bring to this unit an understanding of the solar system therefore when the solar system, the Earth, the sun, the moon and Jupiter are referred to in this unit, it is expected that pupils will be able to access this content.	• the names of a range of different forces – gravity, friction, water resistance, air resistance, upthrust and magnetism • which forces are pushes and which are pulls • the difference between contact and non-contact forces • the difference between balanced and unbalanced forces • who Isaac Newton was and the role he played in helping us to understand forces • what 'matter' is, the difference between mass and weight and how we measure both • how friction works in the world around us • how air resistance works in the world around us • who Galileo Galilei was and the role he played in helping us to understand air resistance • how upthrust (or buoyancy) and water resistance act in water • what 'density' is and the relationship between density and whether an object is able to float • what levers, pulleys and gears are and what they can do to the strength and size of a force	Working Scientifically Upper Key Stage 2: During years 5 and 6, pupils should be taught to use the following practical scientific methods, processes and skills: • planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary • taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate • recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs • using test results to make predictions to set up further comparative and fair tests • reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations • identifying scientific evidence that has been used to support or refute ideas or arguments.	• Forces are pushes and pulls • Forces can change the speed of movement • Forces can change the direction of something • Forces can change the shape of something • There are contact and non-contact forces • Forces can be balanced or unbalanced • Gravity is a non-contact pulling force • Gravity pulls everything towards the Earth • Gravity holds the planets in place in the solar system • Gravity has always existed but was officially discovered and described by Isaac Newton • Mass is how much matter there is in a object and is measured in kilograms and grams • Weight is the force of gravity on an object and is measured in newtons • Friction is a contact force • Friction is a pushing force • Friction is caused by two objects sliding or trying to slide over each other • Friction produces heat • Friction always slows something down • Sometimes friction is useful and other times it is not useful • Air resistance is a pushing force	• air resistance • anti-clockwise • balanced • buoyancy • clockwise • contact force • density • direction • drag • effort • force • friction • fulcrum • gear • gradient • gravitational force • gravity • heat • kilograms/grams • lever • load • machine • magnetism • mass • matter • newton meter • newtons • non-contact force • pull • pulley • push • pushing force • streamlined • surface • surface area • unbalanced • upthrust • vacuum • water resistance • weight

				• Air resistance is a contact force • Air resistance is a type of friction which acts on an object travelling through the air • Galileo Galilei experimented with gravity and mass • His findings help us to understand air resistance on Earth • There is no air on the Moon and so there is no air resistance • Water resistance is a type of friction that acts in water • It is a contact force and a pushing force • Water resistance pushes against objects moving in water and slows them down • Streamlined objects and animals reduce the effects of water resistance • Upthrust is a force which pushes up from the water and makes things float • The density of an object impacts the ability to float • Machines help us to do things • Machines take our effort (force) and use it in a more useful way • Some machines change our force into a larger force or change the direction of a force • Levers, pulleys and gears are all types of simple machine	

				• There are machines all around us that use levers, pulleys and gears	
Spring 1 and Spring 2 Properties and Changes of Materials (Chemistry)	**Scope:** In Year 5, pupils should be taught to compare and group together everyday materials on the basis of their properties. They should also know that some materials will dissolve in liquid to form a solution and describe how to recover a substance from that solution. Pupils should use knowledge of solids, liquids and gases to decide how mixtures might be separated and should be taught to give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials. In addition, pupils should 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 usually irreversible. Within this, pupils should understand the changes associated with burning and the action of acid on bicarbonate of soda. **Sequence:** Pupils studied materials, their properties and their uses in Year 1 and Year 2. In Year 3 they built upon this knowledge through studying the properties of rocks and their uses. In further units of study in Year 3 and Year 4, pupils discovered and investigated the following additional properties of materials: opaque, transparent, translucent, magnetic, non-magnetic, conductor and insulator. In addition, pupils bring an understanding of solids liquids and gases and this knowledge of changing states is key to accessing this unit. This unit has been deliberately placed alongside the 'Asia: Earthquakes and Volcanoes' unit so that links can be made between the two subjects.	• materials can be grouped based on their properties including hardness, solubility, transparency and conductivity • what we mean by 'dissolving' and whether certain substances dissolve in water to form a solution • whether the rate at which a substance dissolves can be altered by heat or stirring • mixtures can be sometimes be separated by sieving, filtering and/or evaporation • the difference between a reversible and an irreversible change • examples of reversible and irreversible changes • the impact of heating and cooling on a range of different materials • what happens when something burns • how new materials are usually formed after an irreversible change • the chemists and scientists who have created new materials that we use in our everyday lives	Working Scientifically Upper Key Stage 2: During years 5 and 6, pupils should be taught to use the following practical scientific methods, processes and skills: • planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary • taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate • recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs • using test results to make predictions to set up further comparative and fair tests • reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations • identifying scientific evidence that has been	• Materials are the substances from which objects are made. • Materials will have different uses based on their properties. • Materials can exist as a solid, liquid or gas, or a mixture of these. • Some materials are natural; they can be found in nature. • Other materials are man-made; they have been created from natural materials or synthesised. • Conductivity is the ability of a material to allow heat or electricity to pass through it. • Materials that allow heat or electricity to pass through them easily are good conductors of heat or electricity. • Materials that do not allow heat or electricity to pass through them are called insulators. • Magnets generate a magnetic field. • The magnetic field exerts a force that attracts or repels objects • Magnets affect materials in different ways, and their response can reveal useful properties. • Some substances dissolve in other substances.	• acid • alkali • attract • base • chemical reaction • classify • combustion • compass • concentrated • condensation • conductivity • conductor • corrosion • create • diluted • dissolve • electrical • evaporation • filtrate • filtration • freeze • hardness • improve • indicator • insoluble • insulator • iron • irreversible • magnetic field • magnetism • man-made • material • materials science • melt • metal • mixture

			used to support or refute ideas or arguments.	• One example is sugar dissolving in water. • The substance that dissolves is called the solute; it dissolves in a solvent and forms a solution. • Some substances do not dissolve; they are insoluble. • We can recover solute from a solution, and one example of this is distillation. • There is a limited amount of solute that can be added to a solvent before it stops dissolving; at this point we say the solution is saturated. • Factors such as temperature and pressure can affect how much solute can be dissolved, and can affect how quickly the solvent dissolves. • A mixture is a substance comprised of more than one material, where those materials are not chemically joined. • Some materials do not dissolve in a solvent; they are insoluble. • Solids can be separated from a mixture through filtration. • Solids of different sizes can be separated through sieving. • Some changes are irreversible; after the change has happened, we	• molecules • natural • neutralisation • particles • property • repel • resistance • reversible • saturated • semiconductor • separation • soluble • solute • solution • solvent • steel • synthetic • thermal • transparency

				cannot recover the original materials. • Irreversible changes produce new materials. • Combustion is an irreversible change; it is a chemical reaction that produces carbon dioxide and water, and gives off energy. • Corrosion is an irreversible change and creates an oxide. • Neutralisation occurs when an acid reacts with a base. • An acid is a substance containing numerous hydrogen ions, which have a positive charge. • A base is a substance containing numerous hydroxide ions, which have a negative charge. • An alkali is a base that is soluble in water. • The pH scale is used to determine if a substance is acidic or alkaline. Lower numbers mean the substance is more acidic and higher numbers mean it is more alkaline; the midpoint, 7, means the substance is neutral. • Scientists try to create new materials with more useful properties. • One example is creating steel by removing the impurities of iron. • There are many examples of scientists known for	

				their contributions to materials science. • Scientists are constantly looking for ways to make new materials, and improve existing materials. • Scientists do this because of the useful properties of materials. • One example is Lewis Howard Latimer, who improved the filament used in lightbulbs, making them affordable and practical enough to be used in homes.	
Summer 1 Lifecycles (Biology)	**Scope:** In Year 5, pupils should be taught to describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird. They should also be taught to describe the life process of reproduction in some plants and animals. **Sequence:** Prior to this unit, pupils may have studied simple animal lifecycles in EYFS and will know about the lifecycle of a flowering plant from Year 3. In Year 2 pupils discovered that animals have offspring and in Year 4 pupils discovered that reproduction is one of the seven characteristics of life.	• the difference between sexual and asexual reproduction • the process of pollination and the role it plays in the lifecycle of a flowering plant • how plants reproduce both sexually and asexually • how different animals produce offspring • how lifecycles differ between animals • how and why gestation periods differ between animals • what a naturalist is and why both Jane Goodall and David Attenborough are considered significant	Working Scientifically Upper Key Stage 2: During years 5 and 6, pupils should be taught to use the following practical scientific methods, processes and skills: • planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary • taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate • recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs • using test results to make predictions to set up	• Animal classes are different groups of animals: amphibian, bird, reptile, mammal and fish. • Vertebrate animals have a back bone • Animal life cycles differ drastically between animal classes. • Some reptiles can give birth to live young (viviparous) • Animal life cycles differ drastically between animal classes. • Some invertebrates have an exoskeleton to protect their internal organs. • There are 6 class of invertebrate: worm, arthropod, echinoderm, molluscs, sponges and cnidarians. • The life cycles of these species vary considerably to vertebrates.	• accomplishments • altricial • amphibian • anther • arthropod • asexual • bird • budding • bulbs • carpel • class • cnidarians • discoveries • echinoderm • embryo • exoskeleton • fetus (foetus) • filament • fish • gestation • grafting • internal organs • invertebrate • life cycle • mammal • molluscs • naturalist • offspring

			further comparative and fair tests • reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations • identifying scientific evidence that has been used to support or refute ideas or arguments.	• Nearly all mammals are viviparous and therefore, have a gestation period. • Gestation periods vary in different mammals depending on two main factors. • Different species can be categorised into: giving birth to altricial young and precocial young. • Plants can either reproduce sexually or asexually. • There are two types of plant: flowering and nonflowering. • Flowering plants use their petals to attract insects to help in their reproduction process. • Nonflowering plants create spores or seeds and disperse them with the help of the wind. • Plants can either reproduce sexually or asexually. • In asexual reproduction, the single parent plant produces identical offspring. • Asexual reproduction can happen naturally with plants creating bulbs, tubers and sending out runners. • Asexual reproduction can happen with human help; propagating, grafting or budding are examples of this. • Jane Goodall was born in 1934, London.	• ovary • ovoviviparous • ovule • parent plant • precocial • propagating • reproduction • reptile • runners • sexual • significant • species • sponges • spores • stamen • stigma • style • Tanzania • tubers • vertebrate • viviparous • worm • zoologist • zygote

				• She was most famous for her work in Tanzania studying and living alongside chimps where she made some amazing discoveries. • David Attenborough was born in 1926, London. • He is most famous for his televised documentaries, sharing his knowledge of plants and the animal kingdom with the world.	
Summer 2 Growing Old (Biology)	**Scope:** In Year 5, pupils should be taught to describe the changes as humans develop as they grow old. **Sequence:** This unit builds on pupils' knowledge of the human body and its processes and functions. Prior to this unit, pupils have studied the skeletal, muscular and digestive systems. Pupils also know that humans, like all organisms, have a lifecycle in which growing and reproduction both play an integral part.	• humans grow and change throughout the human lifecycle • how to place the stages of the human lifecycle on a timeline • the stages of development in babies and children • an introduction to what puberty is • how humans change from adulthood to old age • the changes experienced in old age	Working Scientifically Upper Key Stage 2: During years 5 and 6, pupils should be taught to use the following practical scientific methods, processes and skills: • planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary • taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate • recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs • using test results to make predictions to set up further comparative and fair tests • reporting and presenting findings from enquiries,	• There are six stages of the human life cycle: foetus, baby, childhood, adolescence, adulthood and old age. There are stages of baby development. • They begin as fertilized eggs and then develop into embryos before developing into babies. • Once they are born, these new-born 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+ years old) they experience changes in their body which require them to move more carefully and rest more frequently	• adolescence • adulthood • baby • body hair • bone mass • breasts • calcium • childhood • cognitive change • cognitive development • communication, • diet • egg • emotional change • exercise • exhaustion • facial hair • fallopian tubes • fertility • foetus • gestation • gestation period • hormones • hygiene • independence • internal fertilisation • life-span • litter • live birth • mammals • menopause

			including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations • identifying scientific evidence that has been used to support or refute ideas or arguments.	• Human babies develop in the womb over approximately 40 weeks. • Up to eight weeks it is known as an embryo, after this point it is called a foetus. • There are different stages of development and milestones throughout the pregnancy. • Once they are born, babies are tracked to ensure they are healthy and plotted against what are called centiles. • Tracking a child's growth against these centiles helps indicate if a baby and child are developing well. • Animals also have a gestation period, similar to humans, however the length of time can differ. • Larger animals often have longer gestation period. • Mammals have similar life cycles from young offspring to adulthood. • Some animals continue to live after they can produce offspring, similar to humans, others do not. • Puberty is when the body changes to an adult body. • The changes will be to increase facial and body hair, changes to body shape, increase in sweating and the odour of sweat as well as increased levels of oil on skin. • Boys will notice changes in their penis and testicles	• menstruation • mood swing • offspring • old age • ovary/ovaries • ovum • penis • physical • pregnancy • puberty • pubic hair • sexual reproduction • sperm • testicles • umbilical cord • uterus • vagina • viviparous • womb

				and they might experience a change in their voice. • Girls will develop best tissue and menstruation will begin. • The order of these changes are not the same for everyone. • Discussion around maintaining a high level of hygiene is important. • Children going through puberty will experience changes due to their hormones such as mood swings, exhaustion, stress, extreme emotions which can affect their relationships, ability to do school work or activities they like to do. • It might affect their ability to communicate. • There are skills which can be learnt and support available for pupils going through this. A healthy diet, exercise and enough sleep can help the pupils to go through this stage • Adults age over their lifetime. • After puberty adults continue to change but much slower. • After the age of 45 fertility starts to deteriorate and the risks to mother and baby increase as a woman ages. • When an adult gets older they also experience other changes such as decrease in bone mass and	

				potentially cognitive changes.	
YEAR 6	**Rationale**	**Key content from NC**	**Skills/Processes**	**Essential Knowledge**	**Vocabulary**
Autumn 1 Light and Perception (Physics)	**Scope:** In Year 6, pupils should be taught to recognise that light appears to travel in straight lines and to use this idea to explain that objects are seen because they give out or reflect light into the eye. They should also be taught to 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 and to use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them **Sequence:** This is the second time pupils will have studied light itself. Knowledge from the Year 3 'Light' unit plus knowledge of other types of energy (such as sound from Year 4) will support pupils in accessing the content in this unit. Pupils also studied solids, liquids, and gases in Year 4 and Earth and Space in Year 5, and the knowledge gained in those units will also support them in their understanding.	• that we see when light is reflected from an object into our eyes • light travels (or appears to travel) in straight lines • the parts of the human eye and how the eye works • reflection is when light bounces off a surface and changes the direction of the ray of light • the angle of incidence is always equal to the angle of reflection • how light behaves in water (refraction) • clear white light is made of 7 colours • the colours we see are known as the visible spectrum • light waves can be absorbed, transmitted or reflected to create colour, white or black • how shadows are formed and that they are the same shape as the object that cast them • what light pollution is and its impact on both humans and animals	Working Scientifically Upper Key Stage 2: During years 5 and 6, pupils should be taught to use the following practical scientific methods, processes and skills: • planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary • taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate • recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs • using test results to make predictions to set up further comparative and fair tests • reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentation	• Light is reflected off objects into our eyes • Light travels in straight lines • The human eye is a complex organ • Light enters through the pupil and passes through to the retina • The rods and cones of the retina change the light into electrical signals • The optic nerve takes the signals to the brain • Light bounces off a reflective surface and changes direction • Shiny surfaces reflect light all at the same angles • Rough surfaces reflect scattered light • The law of reflection means the angle of incidence is always equal to the angle of reflection • The normal line is perpendicular to the reflector • Light moves slowly through materials denser than air, like water • Light changes direction when it travels through transparent materials • Refraction is when light slows down and changes direction causing objects	• absorbed • angle • angle of incidence • angle of reflection • angle of refraction • bend • cornea • ecosystems • electromagnetic radiation • glare • illusion • incident ray • iris • lens • light pollution • light trespass • light waves • opaque • optic nerve • perpendicular joint • prism • pupil • reflected • reflected ray • refraction • retina • rods and cones • shadow • shielding • skyglow • the visible spectrum • translucent • transmitted • transparent • wave frequency • wavelength • white light

			• identifying scientific evidence that has been used to support or refute ideas or arguments.	to appear bent or distorted • The angle of refracted light and the angle of incidence are not equal. • Isaac Newton discovered that clear white light is made up of 7 colours • The visible light spectrum is the part of the electromagnetic spectrum that the human eye can see • Light waves can be absorbed, transmitted or reflected to create colour • Objects that absorb all wavelengths of light and reflect no colours create black. • Some objects do not absorb any visible wavelengths of light and reflect all the colours to create white • Shadows are formed by blocking light • Opaque objects create clear shadows • Translucent objects create unclear shadows • Transparent objects cannot create shadows • The lower the angle of the light source, the longer the shadow that is formed • The closer the object is to a light source – the wider the shadow becomes • A brighter light source forms a clearer, more defined shadow • Light pollution is the unnecessary use of light	

				• There are 3 types of light pollution: glare, light trespass and sky glow • Ecosystems are disrupted by light pollution • Light trespass can cause health problems like sleep disorders • Shielding lights properly can reduce light pollution	
Autumn 2 Classification of Species (Biology)	**Scope:** In Year 6, pupils should be taught to describe how living things are classified into broad groups according to common observable characteristics and based on similarities and differences. It states that this classification should include microorganisms, plants and animals and that pupils should give reasons for classifying plants and animals based on specific characteristics. **Sequence:** This unit is designed to expand pupil's knowledge of living things and their habitats by exploring classification in detail. Pupils build on their knowledge from Year 4 and will begin the unit by learning about the significance of Carl Linnaeus' pioneering work in classification. This will outline the rest of the unit as the pupils explore vertebrates (fish, amphibians, reptiles, birds and mammals), invertebrates (such as insects, spiders, snails and worms) and plants by classifying them using the Linnaean System. This unit has been deliberately placed alongside the 'Global Challenges' unit so that links can be made between the two subjects.	• who Carl Linnaeus was and how his work influenced the classification of living things • how to use the Linnaean System of classification • the six kingdoms used in classification are: kingdom archaea, Kingdom Bacteria, Kingdom Protista, Kingdom Fungi, Kingdom Plantae and Kingdome Animalia • how to classify vertebrates and invertebrates • how to classify plants – beginning with vascular and non-vascular • what microorganisms are and how they can be classified • the positive and negative impacts of microorganisms • how habitats are important for the conservation of species	Working Scientifically Upper Key Stage 2: During years 5 and 6, pupils should be taught to use the following practical scientific methods, processes and skills: • planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary • taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate • recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs • using test results to make predictions to set up further comparative and fair tests • reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of and	• Carl Linnaeus was a Swedish scientist who believed it was very important to have a standard system of classification. • Classification is the process of arranging organisms, both living and extinct, into groups based on similar characteristics. • Taxonomy is the science of naming and classifying organisms. • The Linnaean System is the classification method introduced in 1758 by Carl Linnaeus. • The Linnaean system classifies living things into kingdom, then phylum, class, order, family, genus, species • A vertebrate is an animal with a backbone. • There are six kingdoms of classification. The groups are then divided into smaller groups phylum, class then order. • Family – a group of living things which all have very similar features.	• algae • angiosperms • bacteria • biodiversity • botany • bryophytes • characteristics • class • classification • conservation • dichotomous key • evolution • exoskeleton • extinction family • family • fungi • genus • gymnosperms • habitat • hierarchy • invertebrate • microorganism • non-vascular plants • order • phylum • Plantae Kingdom • protozoa • species • taxonomist • taxonomy • The Linnaean System • vascular plants • vertebrate • viruses

			degree of trust in results, in oral and written forms such as displays and other presentations • identifying scientific evidence that has been used to support or refute ideas or arguments.	• Genus - living things are grouped together based on similar features and being closely related. • Species - each living thing is named after its individual features and characteristics. • The Linnaean system classifies living things into kingdom, then phylum, class, order, family, genus, species • An invertebrate is an animal without a backbone. • There are six kingdoms of classification. The groups are then divided into smaller groups phylum, class then order. • Family – a group of living things which all have very similar features. • Genus - living things are grouped together based on similar features and being closely related. • Species - each living thing is named after its individual features and characteristics. • All plants are made up of similar parts that are essential in maintaining their survival. • Flowering plants are the biggest and most varied group of plants. More than 80% of all types of plant produce flowers. Non-vascular plants do not have roots or a stem. • Angiosperms is the scientific name for	

				flowering plants. Gymnosperms is the scientific name for non-flowering plants. • The five different types of living microorganisms are bacteria, viruses, fungi, protozoa, and algae. • Viruses are not included in the six-kingdom classification system. This is because some people do not consider them to be 'alive'. • Many microorganisms can be harmful. Most of the diseases are caused by certain microorganisms. These microbes are called pathogens. • There are many microorganisms that can be helpful such as bacteria in our digestive system and that we include in food and drink. • A habitat is a place where an organism makes its home. • The main elements of a habitat are shelter, water, food, and space. • Biological diversity (also known as biodiversity) is the variety of life on earth • The Earth's biodiversity is in decline due to activities such as deforestation, land-use change, agricultural intensification, over-consumption of natural resources, pollution and climate change.	

				• This has been a widespread loss of 75% of species over a relatively short geological time of two million years.	
Spring 1 and Spring 2 Evolution and Inheritance (Biology)	**Scope:** In Year 6, pupils should be taught to recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago. They should also be taught to recognise that living things produce offspring of the same kind, but normally offspring vary and are not identical o their parents In addition, pupils should be taught to identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution. **Sequence:** Prior to this unit, pupils studied rocks and fossils in Year 3. Their knowledge of fossils as prehistoric organisms will support them accessing the content in this unit. Pupils also know, from across Key Stage 1 and 2, that reproduction is a characteristic of life and that organisms produce offspring that resemble the parents and then grow into adults.	• why the information fossils give us is so important • who Mary Anning was and why her findings are significant • living things have adapted or changed over time to be able to survive in their environments • why animals need to adapt to their environments • natural selection is when living things are better adapted to their environments and have a greater chance of survival • evolution takes a very long time and animals do not simply chose to evolve • who Charles Darwin and Alfred Wallace were and why they are considered significant • why living things produce offspring of the same kind • why offspring vary and are not identical to their parents	Working Scientifically Upper Key Stage 2: During years 5 and 6, pupils should be taught to use the following practical scientific methods, processes and skills: • planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary • taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate • recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs • using test results to make predictions to set up further comparative and fair tests • reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations	• Fossils are the preserved remains or impressions of once living things from the past. • A paleontologist searches for and investigates fossils. • Mary Anning was a paleontologist whose findings are key to understanding how living things on our planet have changed over time. • Her key findings were the complete remains of an ichthyosaur and plesiosaur; sea creatures which are now extinct. • The plesiosaur was a previously unknown creature. • People at the time didn't believe that species could become extinct. • Living things have adapted, or changed, over time to be able to survive in their environment. • Some adaptations help the living thing survive the climate. • Some adaptations enable the living thing to get the nutrition it needs to survive (food or water). • Natural selection is a term that means living things	• adapt • adaptation • artificial selection • cell • characteristics • chromosome • climate change • DNA • dominant • dominant and recessive • environment • evolution • extinct • extinction • fossil • gene • hereditary • ichthyosaur • inheritance • invasive species • living things • natural selection • palaeontologist • plesiosaur • predator • recessive • reproduce • species • survive • survival of the fittest • threat • trait/characteristic • traits • variation

			• identifying scientific evidence that has been used to support or refute ideas or arguments.	that are better adapted to their environments. • Living things that are better adapted tend to have a greater chance of survival and so are able to produce more offspring. • 'Survival of the fittest' is a term which refers to those who are well adapted for their environment and so do survive. • This process leads to evolution. • Living things do not choose to evolve. It happens as a result of environmental changes to their environment. • Evolution takes a very long time to happen. • Charles Darwin and Alfred Wallace both studied evolution. • Living things are made of cells. • Genes contain the information that gives a living thing its characteristics, or traits. • Genes are found inside every cell of a living thing. • These genes are passed on to us by our parents. They are hereditary (inherited from them). • DNA is made up of genes. • Some genes are dominant. Others are recessive. • Our bodies are made up of cells. • Each cell contains chromosomes which are	

				made up of our genetic code, known as our DNA. • We have 46 chromosomes, half from each of our parents. These pair up. • If one of the pair is dominant, it will determine that trait. • Humans can choose which plant or animals to combine in order to select particular traits from different varieties of a species. • Dogs around today are a result of years of artificial selection known as selective breeding. • Gregor Mendel's work used artificial selection as he chose which pea plants to combine. • Living things become extinct when something happens which means they cannot reproduce and so the species dies out. • Things that lead to extinction are: o Changes in the environment itself, o Introduction of new predators o Introduction of new diseases o Introduction of new competitors e.g. for food • Living things are in danger of extinction today because of the actions of humans.	

				• Climate change is the biggest threat to the diversity of life on Earth.	
Summer 1 Electricity and Circuits (Physics)	**Scope:** In Year 6, pupils should be taught to associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit. They should also be taught to 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 change. In addition, pupils should be taught to use recognised symbols when representing a simple circuit in a diagram. **Sequence:** Prior to this unit, pupils studied electricity in Year 4. Pupils know some of the ways that electricity can be produced and can describe some of the appliances in our homes (and schools) that require electricity to function. Pupils understand the dangers presented by electricity and how we can stay safe. They also know how to construct a simple circuit and have investigated different components.	• electricity is a type of energy produced when electrons move around very quickly and create a current • electricity can be produced by generators which can be powered by renewable and non-renewable sources • electrical components in a circuit can be represented by symbols • the symbols for a bulb, cell, battery, buzzer, motor and switch (on and off) • what happens to the components in a circuit if a component is added to the circuit or a component is changed • the difference between a parallel and a series circuit • we measure electricity in volts (V)	Working Scientifically Upper Key Stage 2: During years 5 and 6, pupils should be taught to use the following practical scientific methods, processes and skills: • planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary • taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate • recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs • using test results to make predictions to set up further comparative and fair tests • reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations • identifying scientific evidence that has been	• Electricity is a type of energy that is used to power electrical items. • Electrical energy is caused by electrons moving around very quickly. • We create electricity by using a generator which can be powered by fossil fuels, wind, water and solar. • A circuit will only work if it is a complete circuit (with no gaps). • An electrical circuit must be powered by a power source. For example, a battery. • A battery is made up of one or more cells. • Rather than drawing detailed electrical circuits, they are represented in simple diagrams (with straight lines). • Each component has a symbol to represent it in a diagram. • In a series circuit, electricity flows along one pathway and passes through every component one after the other. • A simple circuit is an example of a series circuit. • In a series circuit, if one component breaks, the rest stops working. • A parallel circuit has branches.	• battery • branches • bulb • buzzer • complete circuit • component • conductor • electric current • electric shock • electrical current • electricity • electrons • generator • high voltage • insulator • motor • parallel circuit • power • power source • proton • series circuit • simple circuit • switch • symbol • voltage • voltmeter • volts

			used to support or refute ideas or arguments.	• Unlike a series circuit, electricity can flow around a parallel circuit along multiple pathways. • Electricity does not need to flow through every component one after the other in a parallel circuit. • In a parallel circuit, if a component on one branch breaks, components of the other branches will still work. • Voltage measures the power of an electrical current. This power is measured in volts (V). • The higher the voltage, the more powerful the electrical current will be. • The voltage in a circuit can be increased by adding more batteries or using batteries with a higher voltage. • Materials that allow electricity to travel through them easily are conductors. • Materials that do not allow electricity to travel through them easily are insulators. • Insulating materials are used to cover electrical appliances to protect us from the electrical current. • It is important to keep safe around electricity because humans are conductors of electricity.	
Summer 2	**Scope:**	• the circulatory system consists of the heart, the	Working Scientifically Upper Key Stage 2:	• Blood is made up of 4 main components: red blood	• addiction • amino acids

Circulation and Lifestyle (Biology)	In Year 6, pupils are taught to identify and name the main parts of the human circulatory system, and to describe the functions of the heart, blood vessels and blood. They are also taught to recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function and to describe the ways in which nutrients and water are transported within animals, including humans. **Sequence:** This unit builds on pupils' knowledge of the human body and its processes and functions. Prior to this unit, pupils have studied the skeletal, muscular and digestive systems. Pupils know that nutrients from food are absorbed into the bloodstream as part of the digestive process and they also know the importance of a healthy lifestyle for the human body in terms of nutrition, exercise and hygiene.	lungs and the systemic system • the role the heart play in the circulatory system the names of the different parts of the human heart • human blood consists of plasma, white blood cells and platelets and red blood cells • the role the lungs play in the circulatory system • how heart rate differs before and after exercise • how nutrients are moved around the body by the circulatory system after they are broken down by the digestive system how diet, exercise and lifestyle impact the heat and the body • what drugs are (legal and illegal) and the impact of different drugs on the human body	During years 5 and 6, pupils should be taught to use the following practical scientific methods, processes and skills: • planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary • taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate • recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs • using test results to make predictions to set up further comparative and fair tests • reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations • identifying scientific evidence that has been used to support or refute ideas or arguments.	cells, white blood cells, plasma and platelets. • Red blood cells carry oxygen around our body • White blood cells fight of disease and infection • Plasma is a straw-coloured liquid carrying the different types of cell. • Platelets clot the holes in blood if you graze or injury yourself. NC – WORKING SCIENTIFICALLY - Researching (reporting findings, identifying scientific evidence.) • The heart has 4 main chambers: Left Atrium, Right Atrium, Left Ventricle and Right ventricle. • The are 4 main blood vessels that transport blood to and from the heart: The Aorta, the Superior Vena Cava, the Pulmonary Artery and the Pulmonary Vein. • Valves ensure the blood travels in only one direction. NC – WORKING SCIENTIFICALLY - Identifying, classifying and grouping (Using diagrams and labels, classification keys) • The circulatory system has a dual circuit. The first is called a pulmonary system the second a systemic system. • Lungs play a large part in the circulatory system, infusing blood with oxygen	• analgesics • arteries • artery • atrium • biconcave • blood vessel • capillaries • carbohydrates • cardiovascular system • circulatory system • cytoplasm • deoxygenated blood • depressant • diastole • diffusion • drug • fatty acids • glucose • haemoglobin • hallucinogens • immunity • lactate • lactic acid • lungs • membrane • minerals • nutrient • oxygenated blood • plasma • platelets • protein • pulmonary circuit • red blood cell • resting heartrate • stimulant • systemic system • systole • target heartrate • vein • ventricle • vitamins • white blood cell

				and exhaling the waste product carbon dioxide. • 3 types blood vessels distribute blood throughout the body: arteries, veins and capillaries. NC – WORKING SCIENTIFICALLY - Researching (Record data using scientific diagrams and labels, classification keys, presenting findings in oral and written forms such as displays and other presentations.) • Our bodies require many nutrients to keep our bodies fit and healthy. • 5 key food groups needed: carbohydrates, proteins, fats, vitamins and minerals. • Our blood transports 3 key nutrients: amino acids, fatty acids and glucose. • Diffusion is the act of transporting nutrients from the digestive track into the circulatory system. NC – WORKING SCIENTIFICALLY - Fair/comparative testing (taking measurements, using a range of scientific equipment, taking repeat readings. Reporting findings, conclusions and predictions.) • Regular exercise strengthens the cardiovascular system - increasing oxygen distribution around the body.	

				• Target heartrate is the rate (beats per minute) you should aim to get to during exercise (for optimum benefits) • Lactate is produced by the body and converted into energy when oxygen levels deplete (lower). • High levels of lactate in muscles can create lactic acid build and muscle cramping/ soreness. NC – WORKING SCIENTIFICALLY - Fair/comparative testing (reporting and presenting findings from enquiries, taking measurements and taking repeat readings) • There are 3 types of drug: legal, legal with restriction and illegal. • Within these 3 types are 4 forms of drug: stimulants, depressants, analgesics and hallucinogens. • All drugs can become addictive. • All drugs can have long term effects on the body if they are overused. NC – WORKING SCIENTIFICALLY - Researching (reporting and presenting findings in oral and written forms such as displays and other presentations)	