Nursery – Ongoing throughout the year					
Animals, excluding humans: • Understand the key features of the life cycle of a plant and an animal. • Begin to understand the need to respect and care for the natural environment and all living things.	**Humans:** • Use all their senses in handson exploration of natural materials • Begin to make sense of their own life-story and family's history. • Understand the key features of the life cycle of a plant and an animal. • Be increasingly independent in meeting their own care needs e.g. brushing teeth, washing and drying their hands thoroughly. • Make healthy choices about food, drink, activity and toothbrushing.	**Living things and their habitats:** • Use all their senses in hands-on exploration of natural materials. • Explore collections of materials with similar and/ or different properties. • Begin to understand the need to respect and care for the natural environment and all living things.	**Plants:** • Use all their senses in handson exploration of natural materials. • Explore collections of materials with similar and/ or different properties. • Plant seeds and care for growing plants. • Understand the key features of the life cycle of a plant and an animal. • Begin to understand the need to respect and care for the natural environment	**Materials, including changing materials:** • Use all their sense in handson exploration of natural materials. • Explore collections of materials with similar and/ or different properties. • Talk about the differences between materials and changes they notice.	**Electricity:** • Explore how things work. **Light:** • Explore how things work. • Talk about the differences in materials and changes they notice. **Forces:** • Explore how things work. • Explore and talk about different forces they can feel. • Talk about the differences between materials and changes they notice. **Sound:**

			and all living things.		• Explore how things work.

Reception – Ongoing throughout the year					
Animals, excluding humans: • Recognise some environments that are different to the one in which they live.	**Humans:** • Talk about members of their immediate family and community. • Name and describe people who are familiar to them. • Manage their own needs. • Know and talk about the different factors that support their overall health and wellbeing: regular physical activity, healthy eating; toothbrushing; having a good sleep routine. • Further develop the skills they need to manage the school day successfully: mealtimes; personal hygiene.	**Living things and their habitats:** • Draw information from a simple map. • Explore the natural world around them. • Describe what they see, hear and feel whilst outside. • Recognise some environments that are different to the one in which they live.	**Seasonal changes:** • Explore the natural world around them. • Describe what they see, hear and feel whilst outside. • Understand the effect of changing seasons on the world around them.	**Materials, including changing materials:** • Explore the natural world around them. • Describe what they see, hear and feel whilst outside.	**Electricity:** • Explore how things work. **Light:** • Describe what they see, hear and feel whilst outside. **Forces:** • Explore the natural world around them. • Describe what they see, hear and feel whilst outside. **Sound:** • Describe what they see, hear and feel whilst outside. **Earth and Space:** • Explore the natural world
					around them.

					• Describe what they see, hear and feel whilst outside.

Year 1	
National Curriculum Objectives	**New Knowledge , Vocabulary and Misconceptions**
Working Scientifically: • 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	Properties**,** observe, test, magnifying glass, object, record, equipment Know that we can ask questions about the world (such as what something is, how things are similar and different, the ways things work, which alternative is better, how things change and how they happen). Know that that when we observe the world to answer these questions, this is science. Know that we can explore the resources provided to try answering the question. Know that we can use our eyes to make careful observations. Know that we can use observations to identify, compare and notice changes in the world around us. Know that we can use our senses aided by equipment (such as magnifying glasses) to make observations. Know that we can use practical resources given to carry out tests to answer a scientific question (with support). Know that we can use observations and testing to compare objects, materials and living things. Know that we can use secondary sources (such as identification sheets or books) to answer questions. Know that we can record observations by taking photographs, videos, drawings, labelled diagrams or in

	writing with support. Know that we can record measurements e.g. using prepared tables, pictograms, tally charts and block graphs with support. Know that we can classify using simple prepared tables and sorting rings with support. Know that we can use experiences of the world around us to suggest appropriate answers to questions. Know how to recognise e 'biggest and smallest', 'best and worst' etc. from their data.

Biology	
National Curriculum Objectives	**New Knowledge , Vocabulary and Misconceptions**
Animals including Humans: • Identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals. • Identify and name a variety of common animals that are carnivores, herbivores and omnivores. • Describe and compare the structure of a variety of common animals (fish, amphibians, reptiles, birds and mammals including pets). • Identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense.	Skeleton, organ, head, body, eyes, ears, mouth, teeth, leg, tail, wing, claw, fin, scales, feathers, fur, beak, paws, hooves, habitat, growth, carnivore, herbivore, omnivore, fish, amphibian, reptile, bird, mammal, touch, see, smell, taste, hear, skin, eyes, nose, ear and tongue. Know the name of a variety of animals from each vertebrate group.. Know that animals vary in many ways having different structures (e.g. wings, tails, ears). Know that animals have different skin coverings (e.g. feathers, fur, hair). Know that fish have gills so they can breathe underwater and have scaly skin. Know that amphibians are different in that they begin their lives with gills but then develop lungs and breathe on land. Know that reptiles are different in that they breathe air and have scaly skin. Know that birds are different to other animals in that they have feathers and wings. Know that mammals are different to other animals in that they have fur/hair **and** they feed milk to their young. Know how to describe key features of a variety of animals. Know that animals eat certain things – some eat other animals, some eat plants, some eat animals and plants. Know the basic names of the human body. Know which body part is associated with each sense (smell and nose). **Misconceptions:** Some children may think:
	• only four-legged mammals, such as pets, are animals • humans are not animals • insects are not animals • all ‘bugs’ or ‘creepy crawlies’, such as spiders, are part of the insect group • amphibians and reptiles are the same.

Seasonal Changes: • observe changes across the 4 seasons • observe and describe weather associated with the seasons and how day length varies	Weather, sun, clouds, wind, snow, ice, seasons, spring, summer, autumn, winter Know that weather changes through the year's seasons. Know that in the UK it is usually colder and rainier in winter. Know that in the UK it is usually hotter and drier in the summer. Know that the change in weather causes many changes such as the number of minibeasts found outside, seed and plant growth, leaves on trees and type of clothes worn by people. **Misconceptions:** Some children may think: • it always snows in winter • it is always sunny in the summer • it rains most in the winter.

Chemistry	
National Curriculum Objectives	**New Knowledge , Vocabulary and Misconceptions**
Everyday Materials: • distinguish between an object and the material from which it is made • identify and name a variety of everyday materials, including wood, plastic, glass, metal, water, and rock • describe the simple physical properties of a variety of everyday materials • compare and group together a variety of everyday materials on the basis of their simple physical properties	Object, material, wood, plastic, glass, metal, water, rock, brick, paper, fabric, elastic, foil, rubber, clay, wool, hard, soft, stretchy, stiff, bendy, floppy, waterproof, absorbent, breaks/tears, rough, smooth, shiny, dull, see through, not see through Know that all objects are made from one or more materials. Know from observation how to distinguish between materials made from wood, plastic, glass, metal, water, rock. Know that materials can be described by being hard, soft, stretchy, stiff, bendy, floppy, solid, runny, smooth, rough, waterproof, absorbent, smooth, shiny, dull, see through, not see through. Know that objects can be grouped based on the materials they are made from. **Misconceptions:** Some children may think: • only fabrics are materials • only building materials are materials • only writing materials are materials • the word ‘rock’ describes an object rather than a material • ‘solid’ is another word for hard.

Seasonal Changes: • observe changes across the 4 seasons • observe and describe weather associated with the seasons and how day length varies	freezing, melting, weather, sun, ice, spring, seasons, summer, autumn, winter, sunrise, sunset. Know that in the UK, the day length is longest at mid-summer and gets shorter each day until mid-winter before getting longer again. Know that the change in weather causes many changes such as the number of minibeasts found outside, seed and plant growth, leaves on trees and type of clothes worn by people. **Misconceptions:** Some children may think: • it always snows in winter • it is always sunny in the summer

	• there are only flowers in spring and summer • it rains most in the winter.
Biology	
National Curriculum Objectives	**New Knowledge , Vocabulary and Misconceptions**
Plants: • identify and name a variety of common wild and garden plants, including deciduous and evergreen trees • identify and describe the basic structure of a variety of common flowering plants, including trees	Leaf, flower, blossom, petal, fruit, berry, root, seed, trunk, stem, bark, stalk, bud, branch, deciduous, evergreen, structure Know the name of trees and plants they see regularly. Know how to describe some key features of these trees and plants (e.g. the shape of the leaves, the colour of the flower/blossom). Know that plants grow from seeds/bulbs. Know that plants need light and water to grow and survive. Know that evergreen trees maintain their leaves throughout the year and that deciduous trees shed their leaves in autumn. Know that a flowering plant consists of roots, stem, leaves and flowers. Know that some parts of a tree or plant are not always the same colour (leaves and stem are not always green).

	Know that a tree's stem is called a trunk. **Misconceptions:** Some children may think: • plants are flowering plants grown in pots with coloured petals and leaves and a stem. • trees are not plants. • all leaves are green. • all stems are green. • a trunk is not a stem. • blossom is not a flower.
Seasonal Changes: • observe changes across the 4 seasons observe and describe weather associated with the seasons and how day length varies	Energy, freezing, melting, orbit, reflection, weather, sun, clouds, wind, snow, ice, seasons, spring, summer, autumn, winter, sunrise and sunset. Know that the Earth orbits the Sun with one orbit constituting a year of 365/366 days. Know that the change in weather causes many changes such as the number of minibeasts found outside, seed and plant growth, leaves on trees and type of clothes worn by people. **Misconceptions:** Some children may think: • it always snows in winter • it is always sunny in the summer • there are only flowers in spring and summer • it rains most in the winter.

Year 2	
National Curriculum Objectives	**New Knowledge , Vocabulary and Misconceptions**
Working Scientifically: • 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	Properties, observe, test, magnifying glass, object, record, equipment Know that we can ask questions about the world and try to answer these (such as what something is, how things are similar and different, the ways things work, which alternative is better, how things change and how they happen). Know that we can explore the resources provided to try answering the question. Know that (with support) there are different ways in which questions can be answered. Know that we can use observations to identify, compare and notice changes in the world around us. Know that we can use our senses aided by equipment (such as magnifying glasses) to make observations. Know that we can take measurements by comparisons developing in to non-standard units. Know that we can use practical resources given to carry out tests to answer a scientific question (with support if needed). Know that can carry out tests to classify; comparative tests; pattern seeking enquiries; and make observations over time. Know that we can use observations and testing to compare objects, materials and living things creating their own criteria. Know that we can use secondary sources (such as identification sheets or books) to answer questions. Know that we can record observations by taking photographs, videos, drawings, labelled diagrams or in writing with support. Know that we can record measurements e.g. using prepared tables, pictograms, tally charts and block graphs with support. Know that we can classify using simple prepared tables and sorting rings with support. Know that we can use experiences of the world around us to suggest appropriate answers to questions. Know how to recognise e 'biggest and smallest', 'best and worst' etc. from their data.
Biology	

National Curriculum Objectives	New Knowledge , Vocabulary and Misconceptions
Animals inc, Humans: • notice that animals, including humans, have offspring which grow into adults • find out about and describe the basic needs of animals, including humans, for survival (water, food and air) • describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene	Offspring, reproduction, growth, child, young/old stages (examples - chick/hen, baby/child/adult, caterpillar/butterfly), exercise, heartbeat, breathing, hygiene, germs, disease, food types (examples – meat, fish, vegetables, bread, rice, pasta) Know that animals, including humans, have offspring which grow into adults. Know that in humans and some animals these offspring will be young (babies and kittens) that grow in to adults. Know that in other animals (chicken or insects) there may be eggs laid to hatch to young or others stages which then grow in to adults. Know that the young of some animals do not look like their parents (frogs and tadpoles). Know that animals, including humans, need food, water and air to survive Know the basic food groups: fruits and vegetables, carbohydrates, protein, dairy, fat and sugary food. Know that fats and sugary foods should be eaten rarely and in small amounts Know that humans need to exercise for a minimum of 30 minutes per day to help their body stay fit and strong Know that good hygiene is important in preventing infections and illnesses. **Misconceptions:** Some children may think: • an animal's habitat is like its 'home' • all animals that live in the sea are fish • respiration is breathing • breathing is respiration.

Living Things and Their Habitat: • explore and compare the differences between things that are living, dead, and things that have never been alive • identify that most living things live in habitats to which they are suited and describe how different habitats provide for the basic needs of different kinds of animals and plants, and how they depend on each other • identify and name a variety of plants and animals in their habitats, • • including microhabitats describe how animals obtain their food from plants and other animals, using the idea of a simple food chain, and identify and name different sources of food	Living, dead, never been alive, suited, suitable, basic needs, food, food chain, shelter, move, feed, names of local habitats e.g. pond, woodland etc. names of micro-habitats e.g. under logs, in bushes etc. Know that all objects are either living, dead or have never been alive. Know that living things are plants (including seeds) and animals. Know that dead things include dead animals and plants including parts of plants and animals that are no longer attached (leaves, twigs, shells, fur, hair and feathers). Know that an object made from wood is classed as dead. Know that objects made from rock, metal and plastic have never been alive. Know that animals and plants live in a habitat. Know the name of a range of animals and plants that live in a habitat. Know that animals live in a habitat with features to allow them to move and find food. Know that plants live in a habitat with features to help them grow well. Know that a habitat provides the basic needs of the animal or plant – shelter, food and water. Know that in a habitat there are different micro-habitats e.g. in a woodland – in the leaf litter, on the bark of trees, on the leaves. Know that micro-habitats have different conditions e.g. light or dark, damp or dry. Know that in a micro-habitat, conditions affect which plants and animals live there. Know that the plants and animals in a habitat depend on each other for food and shelter. Know that the way animals obtain their food from plants and other animals can be shown in a food chain. M**isconceptions:** Some children may think: • an animal's habitat is like its 'home' • plants and seeds are not alive as they cannot be seen to move • fire is living • arrows in a food chain mean 'eats'.

Chemistry	
National Curriculum Objectives	**New Knowledge , Vocabulary and Misconceptions**
Uses of Everyday Materials: • identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses • find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching	Wood, metal, plastic, glass, brick, rock, paper, cardboard, opaque, transparent and translucent, reflective, non- reflective, flexible, rigid, shape, push/pushing, pull/puling, twist/twisting, squash/squashing, bend/bending, stretch/stretching. Know the name of a variety of materials (wood, metal, plastic, glass, brick, rock, paper, cardboard). Know how to explain key properties of a variety of materials. Know that some materials can be bent, stretched, squashed and twisted. Know that material can be tested and grouped or classified. Know (with support) how to choose an appropriate method for testing a material for a particular property. Know that properties of materials can make them suitable or unsuitable for a particular purpose. Know that a material can be suitable for more than one purpose. Know that solids have a definitive shape that is not easy to change. **Misconceptions:**

	Some children may think: • only fabrics are materials • only building materials are materials • only writing materials are materials • the word rock describes an object rather than a material • a solid is another word for hard.
Biology	
National Curriculum Objectives	**New Knowledge , Vocabulary and Misconceptions**
Plants: • observe and describe how seeds and bulbs grow into mature plants • find out and describe how plants need water, light and a suitable temperature to grow and stay healthy	Light, shade, sun, warm, cool, water, grow, healthy, germinate, seedlings Know that plants grow from either seeds or bulbs buried in soil. Know that plants need light, water and warmth to grow and survive Know that seeds or bulbs will germinate and grow into seedlings. Know that mature plants may have flowers which then develop in to seeds, berries, fruit, etc (reproduce). Know that seeds and bulbs need to be planted outside at different times of the year and can grow at different rates. Know that plants are important for the world. Know that we need plants to survive by cleaning the air and to eat. **Misconceptions:** Some children may think: • plants are not alive as they cannot be seen to move • seeds are not alive • all plants start out as seeds • seeds and bulbs need sunlight to germinate.
Year 3	

Year 3	
National Curriculum Objectives	**New Knowledge , Vocabulary and Misconceptions**
Working Scientifically: • 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	Prediction, measurement, enquiry, independent variable, dependent variable, fair test, theory, hypothesis Know how to ask questions based on our prior science knowledge and can answer them by setting up scientific enquiries (with support). Know how to answer questions posed by the teacher by setting up scientific experiments. Know how to choose resources and gather evidence based on their own decisions. Know how to use secondary sources to answer questions. Know that there are different types of science enquiry. Know how to make careful and systematic observations (with support). Know how to use a range of equipment for measuring length, time, temperature and capacity (with support). Know how to follow their plan to carry out: observations and tests to classify; comparative and simple fair tests; observations over time; and pattern seeking (with support). Know that a comparative test is performed by changing a variable that is qualitative e.g. the type of material, shape of the parachute. Know that a fair test is performed by changing a variable that is quantitative e.g. the thickness of the material or the area of the canopy. Know how to record and present evidence (with support). Know how to record their observation e.g. using photographs, videos, pictures, labelled diagrams or writing (with support). Know how to record their measurements with support as necessary) e.g. using tables, tally charts and bar charts (given templates, if required, to which they can add headings). Know how to record classifications e.g. using tables, Venn diagrams, Carroll diagrams. Know how to (with support) present the same data in different ways in order to help with answering the question. Know how to interpret their data to generate simple comparative statements based on their evidence. Know how to begin to identify naturally occurring patterns and causal relationships. Know how to draw conclusions based on their evidence and current subject knowledge.

• identifying differences, similarities or changes related to simple scientific ideas and processes • using straightforward scientific evidence to answer questions or to support their findings	Know how to adapt their method as they progress or how they would do it differently if they repeated the enquiry. Know how to use their evidence to suggest values for different items tested using the same method e.g. the distance travelled by a car on an additional surface. Know how to follow a scientific experience and begin ask further questions which can be answered by extending the same enquiry. Know how to communicate their findings to an audience both orally and in writing, using appropriate scientific vocabulary.

Biology	
National Curriculum Objectives	**New Knowledge , Vocabulary and Misconceptions**
Animals inc, Humans: • identify that animals, including humans, need the right types and amount of nutrition, and that they cannot make their own food; they get nutrition from what they eat • identify that humans and some other animals have skeletons and muscles for support, protection and movement	Nutrition, nutrients, carbohydrates, sugars, protein, vitamins, minerals, fibre, fat, water, skeleton, bones, muscles, support, protect, move, skull, ribs, spine, muscles, joints Know that, unlike plants which make their own food, animals need to eat to get the nutrients they need. Know that food contains a range of different nutrients (carbohydrates, including sugars, protein, vitamins, minerals, fats, sugars and water. Know that fibre is also needed by the body to stay healthy. Know that one piece of food can provide a range of nutrients. Know how to explore the nutritional content found in food. Know that humans, and some other animals, have a skeleton and muscles. Know that a skeleton and muscles provide movement, protection and support. Know the names of some bones that make up their skeleton, giving examples of how it supports, protects and helps them to move. Know how to describe how muscles and joints help humans to move. **Misconceptions:** Some children may think: • certain whole food groups like fats are ‘bad’ for you

	• certain specific foods, like cheese are also 'bad' for you • diet and fruit drinks are 'good' for you • snakes are similar to worms, so they must also be invertebrates • invertebrates have no form of skeleton.

Chemistry & Biology

National Curriculum Objectives	New Knowledge , Vocabulary and Misconceptions
Rocks: • compare and group together different kinds of rocks on the basis of their appearance and simple physical properties • describe in simple terms how fossils are formed when things that have lived are trapped within rock • recognise that soils are made from rocks and organic matter	Rock, stone, pebble, boulder, grain, crystals, layers, hard, soft, texture, absorb water, erosion, organic, soil, fossil, marble, mineral, chalk, granite, sandstone, slate, soil, peat, sandy/chalk/clay soil, bedrock, sub soil, top soil Know that rock is a naturally occurring material. Know that there are different types of rock (sedimentary, metamorphic and igneous). Know that different rocks have different properties. Know that rocks can be hard or soft, Know that rocks can have different sizes of grains or crystals. Know that some rocks can absorb water. Know that rocks can be different shapes and sizes. Know that soils are made up of ground down rock which may be mixed with plant and animal material (organic matter). Know that the property of soil can be affected by the type, size of rock and amount of organic matter it contains. Know that some rocks are fossils. Know that fossils were formed millions of years ago. Know that fossils are deceased plants or animals. Know that fossils are formed on a seabed by being covered and squashed by other materials. Know that the deceased animal or plant dissolves over time and is replaced by minerals from the water. **Misconceptions:** Some children may think:

	• rocks are all hard in nature • rock-like, man-made substances such as concrete or brick are rocks • materials which have been polished or shaped for use, such as a granite worktop, are not rocks as they are no longer 'natural' • certain found artefacts, like old bits of pottery or coins, are fossils • a fossil is an actual piece of the extinct animal or plant • soil and compost are the same thing.

Plants: • identify and describe the functions of different parts of flowering plants: roots, stem/trunk, leaves and flowers • explore the requirements of plants for life and growth (air, light, water, nutrients from soil, and room to grow) and how they vary from plant to plant • investigate the way in which water is transported within plants • explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal	Photosynthesis, pollen, insect/wind pollination, seed formation, seed dispersal (wind dispersal, animal dispersal, water dispersal). Know that many plants, but not all, have roots, stems/trunks, leaves and flowers/blossom. Know that roots absorb water and nutrients from the soil. Know that roots anchor the plant in place. Know that the stem transports water and nutrients/ minerals around the plant. Know that the stem holds the leaves flowers up in the air to enhance photosynthesis, pollination and seed dispersal. Know that leaves use sunlight and water to produce the plants food. Know that some plants produce flowers which enable the plant to reproduce. Know that pollen is produced by the male part of the plant. Know that pollen is transferred to the female part of other flowers (pollination). Know that pollination forms seeds, sometimes contained within berries or fruits. Know that seeds can be dispersed in different ways. Know that different plants require different conditions for germination and growth. **Misconceptions** Some children may think: • plants eat food • food comes from the soil via the roots • flowers are merely decorative rather than a vital part of the life cycle in reproduction

	• plants only need sunlight to keep them warm • roots suck in water which is then sucked up the stem.
Physics	
National Curriculum Objectives	**New Knowledge , Vocabulary and Misconceptions**
Forces and Magnets: • compare how things move on different surfaces • notice that some forces need contact between 2 objects, but magnetic forces can act at a distance • observe how magnets attract or repel each other and attract some materials and not others • compare and group together a variety of everyday materials on the basis of whether they are attracted to a magnet, and identify some magnetic materials describe magnets as having 2 poles predict whether 2 magnets will attract or repel each other, depending on which poles are facing	Force, push, pull, twist, contact force, non-contact force, magnetic force, magnet, strength, bar magnet, ring magnet, button magnet, horseshoe magnet, attract, repel, magnetic material, metal, iron, steel, poles, north pole, south pole Know that a force is a push and or a pull. Know that when an object moves on a surface, the texture of the surface and the object affect how it moves and provide examples (ice skate and shoes on ice). Know that for some forces to act there must be contact and can give examples used in everyday life (hand opening a door, wind pushing the trees). Know that a magnet attracts magnetic material. Know that iron and nickel and other materials containing these e.g. stainless steel, are magnetic. Know how to classify materials as magnetic or non- magnetic. Know the name of a range of types of magnets. Know that magnets have two poles – a north pole and a south pole. Know that if two north poles are brought together thy will push away from each other – repel. Know that if a north and a south pole are brought together they will push together – attract. Know that some forces can act at a distance (magnetism). Know how to describe how poles attract and repel using labelled diagrams. **Misconceptions:** Some children may think: • the bigger the magnet the stronger it is • all metals are magnetic.

• **Light:** recognise that they need light in order to see things • and that dark is the absence of light notice that • light is reflected from surfaces recognise that light from the sun can be dangerous and that there are • ways to protect their eyes recognise that shadows are formed when the light from a light source is • blocked by an opaque object find patterns in the way that the size of shadows change	Light, light source, dark, absence of light, transparent, translucent, opaque, shiny, matt, surface, shadow, reflect, mirror, sunlight, dangerous Know that we see objects because our eyes can sense light. Know that dark is the absence of light. Know that we cannot see anything in complete darkness. Know that some object such as the sun, light bulbs and candles are sources of light. Know that we can see light sources shining directly into our eyes but to see other objects, light from a source must first shine on the object and then be reflected into our eyes. Know that some surfaces reflect light. Know that objects are easier to see as they are more reflective or shiny. Know that the light from the sun can damage our eyes and therefore we should not look directly at the sun Know that we can protect our eyes by wearing sunglasses or sunhats in bright light. Know that shadows are formed on a surface when an opaque or translucent object is between a light source and the surface and blocks some of the light. Know that the size of the shadow depends on the position of the source, object and surface. **Misconceptions:** Some children may think: • we can still see even where there is an absence of any light • our eyes 'get used to' the dark • the moon and reflective surfaces are light sources • a transparent object is a light source • shadows contain details of the object, such as facial features on their own shadow • shadows result from objects giving off darkness.

Year 4	
National Curriculum Objectives	**New Knowledge , Vocabulary and Misconceptions**
Working Scientifically: • 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 answer questions or to support their findings	prediction, measurement, enquiry, dependent variable, independent variable, fair test, similar, theory, hypothesis Know how to ask questions based on our prior science knowledge and can answer them by setting up scientific enquiries. Know how to answer questions posed by the teacher by setting up scientific experiments. Know how to choose resources and gather evidence based on their own decisions. Know how to use secondary sources to answer questions. Know that there are different types of science enquiry. Know how to make careful and systematic observations. Know how to use a range of equipment for measuring length, time, temperature and capacity. Know how to follow their plan to carry out: observations and tests to classify; comparative and simple fair tests; observations over time; and pattern seeking. Know that a comparative test is performed by changing a variable that is qualitative e.g. the type of material, shape of the parachute. Know that a fair test is performed by changing a variable that is quantitative e.g. the thickness of the material or the area of the canopy. Know how to record and present evidence. Know how to record their observation e.g. using photographs, videos, pictures, labelled diagrams or writing. Know how to record their measurements e.g. using tables, tally charts and bar charts (given templates, if required, to which they can add headings). Know how to record classifications e.g. using tables, Venn diagrams, Carroll diagrams. Know how to (with support) present the same data in different ways in order to help with answering the question. Know how to interpret their data to generate simple comparative statements based on their evidence. Know how to begin to identify naturally occurring patterns and causal relationships.

	Know how to draw conclusions based on their evidence and current subject knowledge.

	Know how to adapt their method as they progress or how they would do it differently if they repeated the enquiry. Know how to use their evidence to suggest values for different items tested using the same method e.g. the distance travelled by a car on an additional surface. Know how to follow a scientific experience and ask further questions which can be answered by extending the same enquiry. Know how to communicate their findings to an audience both orally and in writing, using appropriate scientific vocabulary.
Biology	
National Curriculum Objectives	**New Knowledge , Vocabulary and Misconceptions**
Animals inc, Humans: • describe the simple functions of the basic parts of the digestive system in humans • identify the different types of teeth in humans and their simple functions • construct and interpret a variety of food chains, identifying producers, predators and prey	Digestive system, digestion, mouth, teeth, saliva, oesophagus, stomach, small intestine, nutrients, large intestine, rectum, anus, teeth, incisor, canine, molar, premolars, herbivore, carnivore, omnivore, producer, predator, prey, food chain Know that food enters the body through the mouth. Know that digestion starts when the teeth start to break the food down. Know that humans have three different types of teeth (incisors, canines and molars). Know how to describe the shape and use of all three types of teeth. Know that saliva is added and the tongue rolls the food in to a ball. Know that the food is swallowed and passes down the oesophagus to the stomach. Know that food in the stomach is broken down further by gases. Know that the food passes in to the small intestine. Know that in the small intestine nutrients are removed from the food and leave the digestion system to be used elsewhere in the body. Know that the rest of the food passes in to the large intestine where water is removed for use elsewhere in the body. Know that what is left is stored in the rectum until it leaves the body through the anus.

	Know that living things can be classifies as producers, predators and prey according to their place in the food chain. Know how to construct and can discuss a food chain.

	Misconceptions: Some children may think: • arrows in a food chains mean 'eats' • the death of one of the parts of a food chain or web has no, or limited, consequences on the rest of the chain • there is always plenty of food for wild animals • your stomach is where your belly button is • food is digested only in the stomach • when you have a meal, your food goes down one tube and your drink down another • the food you eat becomes "poo" and the drink becomes "wee".

Living Things and Their Habitats: • recognise that living things can be grouped in a variety of ways • explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment • recognise that environments can change and that this can sometimes pose dangers to living things	Classification, classification keys, environment, habitat, human impact, positive, negative, migrate, hibernate Know that livings things (plants and animals) live in a habitat which provides an environment to which they are suited (Year 2 learning). Know that environments may change naturally e.g. through flooding, fire, earthquakes etc. Know that humans can cause an environment to change. Know that when a human changes an environment in a good way such as setting up a nature reserve that it is positive human impact. Know that when a human changes an environment in a bad way such as littering it is negative human impact. Know that environments can change with the seasons such as different living things can be found in a habitat at different times of the year. Know how an environment may change naturally and due to human impact. Know how to use secondary sources to find out about how environments can change naturally and by human impact. Know how to use classification keys to identify or group living things. **Misconceptions:** Some children may think: • the death of one of the parts of a food chain or web has no or limited consequences on the rest of the chain • there is always plenty of food for wild animals • animals are only land-living creatures • animals and plants can adapt to their habitats, however they change all changes to habitats are negative.

Chemistry	
National Curriculum Objectives	**New Knowledge , Vocabulary and Misconceptions**
States of Matter: • compare and group materials together, according to whether they are solids, liquids or gases • observe that some materials change state when they are heated or cooled, and measure or research the temperature at which this happens in degrees Celsius (°C) • identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature	Solid, liquid, gas, state change, melting, freezing, melting point, boiling point, evaporation, temperature, water cycle Know that objects are composed of a material in one of three states of matter: solid, liquid or gas. Know that these are made of tiny particles and are organised differently in different states. Know that a solid keeps it shape and has a fixed volume. Know that a liquid has a fixed volume but changes in shape to fit the container. Know that a liquid can be poured ad keeps a level, horizontal surface. Know that a gas fills all available space and has no fixed shape or volume. Know that granular or powdery solids like sand can be confused with liquids because they can be poured, but when poured they form a heap and they do not keep a level, horizontal surface. Know that each individual grain of and demonstrates the properties of a solid. Know that melting is a state change from solid to liquid. Know that freezing is a state change from liquid to solid. Know that th freezing point of water is 0 °c. Know that boiling is a change of state from liquid to gas. Know that when a liquid is heated to a specific temperature and bubbles occur, these bubbles are gas. Know that water boils at 100 °C. Know that evaporation is the same state change as boiling but happens much slower at a lower temperature. Know that condensation is the change back from a gas to a liquid caused by cooling. Know that water flows around the world in a continuous process called the water cycle. Know that water at the surface of rivers, seas, etc evaporates into water vapour (a gas).

	Know that water vapour rises, and then cools and condenses back in to a liquid forming clouds. Know that when too much water condenses that the cloud becomes too heavy and water droplets fall back down as rain, snow, sleet, etc and that this is called precipitation. Know that the water droplets collect again in to rivers, seas, etc. **Misconceptions:** Some children may think: • 'solid' is another word for hard or opaque • solids are hard and cannot break or change shape easily and are often in one piece • substances made of very small particles like sugar or sand cannot be solids • particles in liquids are further apart than in solids and they take up more space • when air is pumped into balloons, they become lighter • water in different forms – steam, water, ice – are all different substances • all liquids boil at the same temperature as water (100 degrees) • melting, as a change of state, is the same as dissolving • steam is visible water vapour (only the condensing water droplets can be seen) • clouds are made of water vapour or steam • the substance on windows etc. is condensation rather than water • the changing states of water (illustrated by the water cycle) are irreversible • evaporating or boiling water makes it vanish evaporation is when the sun sucks up the water, or when water is absorbed into a surface/material.

Physics	
National Curriculum Objectives	**New Knowledge , Vocabulary and Misconceptions**
Electricity: • identify common appliances that run on electricity • construct a simple series electrical circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers • identify whether or not a lamp will light in a simple series circuit, based on whether or not the lamp is part of a complete loop with a battery recognise that a switch opens and closes a circuit and associate this with whether or not a lamp lights in a simple series circuit • recognise some common conductors and insulators, and associate metals with being good conductors	Electricity, electrical appliance/device, mains, plug, electrical circuit, complete circuit, component, cell, battery, positive, negative, connect/connections, loose connection, short circuit, crocodile clip, bulb, switch, buzzer, motor, conductor, insulator, metal, non-metal, symbol Know that many household devices and appliances run on electricity. Know that electrical devices or appliances either plug in to the mains or run on batteries. Know that an electrical circuit consists of a cell or battery connected to a component using wires. Know that if there is a break in the circuit, a loose connection or a short circuit the component will not work. Know that a switch can be added to the circuit to turn the component on and off. Know that metals are good conductors so they can be used as wires in a circuit. Know that non-metallic solids are insulators except for graphite (pencil lead). Know that water, if not completely pure, also conducts electricity – do not allow children to use water and electricity – teach health and safety. Know how to construct a range of circuits. **Misconceptions:** Some children may think: • electricity flows to bulbs, not through them • electricity flows out of both ends of a battery • electricity works by simply coming out of one end of a battery into the component.

Sound: • identify how sounds are made, associating some of them with something vibrating • recognise that vibrations from sounds travel through a medium to the ear • find patterns between the pitch of a sound and features of the object that produced it • find patterns between the volume of a sound and the strength of the vibrations that produced it • recognise that sounds get fainter as the distance from the sound source increases	sound, source, vibrate, vibration, travel, pitch (high, low), volume, faint, loud, insulation Know that a sound source vibrates to produce sound waves. Know that sound waves travel through a medium from the source to our ears. Know that different mediums such as air or water or wood can carry sound. Know that sound cannot travel through a vacuum (an area empty of matter). Know that sound waves cause parts of our body inside our ears to vibrate, allowing us to hear (sense) the sound. Know that the loudness (volume) of the sound depends on the amount of energy of vibrations and how well they travel through the medium. Know that bigger vibrations cause louder sounds. Know that sounds decrease in volume the further they have to travel. Know that pitch is the highness or lowness of a sound. Know that pitch is affected by the features of objects producing the sounds (smaller objects produce higher pitch sounds). **Misconceptions:** Some children may think: • sound is only heard by the listener • sound only travels in one direction from the source • sound can't travel through solids and liquids • high sounds are load and low sounds are quiet. • pitch and volume are frequently confused, as both can be described as high or low.

Year 5	
National Curriculum Objectives	**New Knowledge , Vocabulary and Misconceptions**
Working Scientifically: • 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 a 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	Prediction, measurement, enquiry, dependent variable, independent variable, fair test, similar, theory, hypothesis, line graph, relationship, outlier Know how to ask scientific questions stimulated by an experiment. Know how to ask further scientific questions based on their prior know ledge. Know that scientific evidence to answer a question is gathered through a wide range of resources. Know why a specific enquiry type has been chosen to answer a scientific question. Know that secondary sources can be used to answer scientific questions as well as practical work. Know how to select and use a selection of equipment to measure accurately (ruler, tape measure, trundle wheel, force meter with a suitable scale). Know that to take repeat readings during an enquiry is fair testing. Know that increasing the sample size during an enquiry is pattern seeking. Know that adjusting the observation period and frequency is observing over time. Know that checking further secondary sources is researching. Know how to plan and conduct an enquiry to answer their scientific question/ hypothesis. Know to record observations through annotated photographs, videos, labelled diagrams, observational drawings or writing. Know to record measurements by using tables, tally charts, bar charts, line graphs and scatter graphs. Know to record classifications using tables, Venn diagrams, Carroll diagrams and classification keys. Know that the same data can be presented in different ways to help answer the scientific question. Know that predictions are made based on their scientific enquiry knowledge. Know that predictions can be tested using comparative and fair tests. Know how to identify causal relationships and patterns in the natural world from their evidence and how to explain these in a conclusion. Know that results do not always fir the overall pattern and how to explain this in a conclusion.

	Know how to explain findings using scientific vocabulary in a conclusion. Know how to evaluate the method used, the control of variables, the precision and accuracy of measurements and the credibility of secondary sources used. Know how to identify any limitations that reduce the trust they have in their data. Know that scientific ideas can change due to new evidence that they have gathered. Know how to talk about how new discoveries change scientific understanding. Know how to discuss evidence when answering questions based on observations, measurements taken or information gathered through secondary sources supports or refutes their answer.
Biology	
National Curriculum Objectives	**New Knowledge , Vocabulary and Misconceptions**
Animals inc, Humans: • describe the changes as humans develop to old age	Puberty, embryo, womb, weaned, adolescent, metamorphosis, pupa, larva, chrysalis. Know that when babies are young they grow rapidly. Know that babies are very dependent on their parents. Know that as babies develop, they learn many skills. Know how to explain how a baby changes physically as it grows, and also what it is able to do. Know that at puberty, a child's body changes and develops primary and secondary sexual characteristics. Know how to describe changes that take place in boys and girls during puberty. Know that sexual characteristics enable adults to reproduce. **Misconceptions:** Some children may think: • a baby grows in a mother's tummy • a baby is "made".

Living Things and Their Habitats: • describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird • describe the life process of reproduction in some plants and animals	Life cycle, reproduce, sexual, sperm, fertilises, egg, live young, metamorphosis, asexual, plantlets, runners, bulbs, cuttings Know that as part of their life cycle plants and animals reproduce. Know that most animals reproduce sexually, which involves two parents where the sperm from the male fertilises the female egg. Know that humans and some animals these offspring will be born live, such as babies or kittens, and then grow into adults. Know that other animals, such as chickens or snakes, there may be eggs laid that hatch to young which then grow to adults. Know that some young undergo a further change before becoming adults e.g. caterpillars to butterflies - this is called a metamorphosis. Know that plants reproduce both sexually and asexually. Know that bulbs, tubers, runners and plantlets are examples of asexual plant reproduction which involves only one parent. Know that sexual reproduction in plants occurs through pollination, using involving wind or insects. **Misconceptions:** Some children may think: • all plants start out as seeds • all plants have flowers • plants that grow from bulbs do not have seeds • only birds lay eggs.

Chemistry	
National Curriculum Objectives	**New Knowledge , Vocabulary and Misconceptions**
Properties and Changing Materials: • compare and group together everyday materials on the basis of their properties, including their hardness,	Thermal/electrical insulator/conductor, change of state, mixture, dissolve, solution, soluble, Insoluble, filter, sieve, reversible/non-reversible change, burning, rusting, new material.

solubility, transparency, conductivity (electrical and thermal), and response to magnets • know that some materials will dissolve in liquid to form a solution, and describe how to recover a substance from a solution • use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic • demonstrate that dissolving, mixing and changes of state are reversible changes • explain that some changes result in the formation of new materials, and that this kind of change is not usually reversible, including changes associated with burning and the action of acid on bicarbonate of soda •	Know that materials have different uses depending on their properties and state of matter. Know that properties include hardness, transparency, electrical and thermal conductivity and attraction to magnets. Know how to compare or group everyday materials by different properties. Know that some materials will dissolve in a liquid and form a solution while others are insoluble and form sediment. Know that mixtures can be separated by filtering, sieving and evaporation. Know how to use their knowledge of solids, liquids and gases suggest how materials can be recovered from solutions or mixtures by evaporation, filtering or sieving. Know that some changes to materials such as dissolving, mixing and changes of state are reversible, but some changes such as burning wood, rusting and mixing vinegar with bicarbonate of soda result in the formation of new materials and these are not reversible. Know how to describe some simple reversible and non- reversible changes to materials and give examples. Know how to explain their results from their investigations involving dissolving and non-reversible change. **Misconceptions:** Some children may think: • thermal insulators keep cold in or out • thermal insulators warm things up • solids dissolved in liquids have vanished and so you cannot get them back • lit candles only melt, which is a reversible change. • Lots of misconceptions exist around reversible and irreversible changes, including around the permanence or impermanence of the change. There is confusion between physical/ chemical changes and reversible and irreversible changes. They do not correlate simply. Chemical changes result in a new material being formed. These are mostly irreversible. Physical changes are often reversible but may be permanent. These do not result in new materials e.g. cutting a loaf of bread. It is still bread, but it is no longer a loaf. The shape, but not the material, has been changed.

Physics	
National Curriculum Objectives	**New Knowledge , Vocabulary and Misconceptions**
Earth and Space: • describe the movement of the Earth and other planets relative to the sun in the solar system • describe the movement of the moon relative to the Earth • describe the sun, Earth and moon as approximately spherical bodies • use the idea of the Earth's rotation to explain day and night and the apparent movement of the sun across the sky	Earth, Sun, Moon, (Mercury, Jupiter, Saturn, Venus, Mars, Uranus, Neptune), spherical, solar system, rotates, star, orbit, planets Know that the Sun is a star. Know that the sun is at the centre of our solar system. Know that there are 8 planets (can name them). Know that planets travel around the sun in fixed orbits. Know that Earth takes 365 ¼ days to complete its orbit around the sun Know that the earth rotates (spins) on its axis Know that as earth rotates, half faces the sun (here it is day) and half is facing away from the sun (night). Know that as the earth rotates the sun appears to move across the sky Know that the moon orbits the earth. Know that takes about 28 days to complete its orbit. Know that the sun, earth and moon are approximately spherical. **Misconceptions:** Some children may think: • the Earth is flat • the Sun is a planet • the Sun rotates around the Earth • the Sun moves across the sky during the day • the Sun rises in the morning and sets in the evening • the Moon appears only at night • night is caused by the Moon getting in the way of the Sun or the Sun moving further away from the Earth.

Forces: • explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object • identify the effects of air resistance, water resistance and friction, that act between moving surfaces • recognise that some mechanisms including levers, pulleys and gears allow a smaller force to have a greater effect	Circuit, complete circuit, circuit diagram, circuit symbol, cell, battery, bulb, buzzer, motor, switch, voltage Know that a force causes an object to start moving, stop moving, speed up, slow down or change direction. Know that gravity is a force that acts at a distance. Know that everything is pulled towards the earth by gravity, which is why unsupported objects fall to the floor. Know how to demonstrate the effect of gravity acting on an unsupported object. Know that air resistance, water resistance and friction are contact forces that act between moving surfaces. Know and can provide examples of when it is beneficial to have high or low friction, water resistance or air resistance. Know that a mechanism is a device that allows a small force to be increased to a larger force. Know that pulleys, levers and gears are all mechanisms, which can also be known as simple machines. Know how to demonstrate how pulleys, levers and gears work. **Misconceptions:** Some children may think: • The heavier the object the faster it falls, because it has more gravity acting on it • Forces always act in pairs which are equal and opposite • Smooth surfaces have no friction • Objects always travel better on smooth surfaces • A moving object has a force which is pushing it forwards and it stops when the pushing force wears out • A non-moving object has no forces acting on it • Heavy objects sink and light objects float.

Year 6	
National Curriculum Objectives	**New Knowledge , Vocabulary and Misconceptions**
Working Scientifically: • 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 a 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	Prediction, measurement, enquiry, dependent variable, independent variable, fair test, similar, theory, hypothesis, line graph, relationship, outlier Know how to ask scientific questions stimulated by an experiment. Know how to ask further scientific questions based on their prior know ledge. Know that scientific evidence to answer a question is gathered through a wide range of resources. Know why a specific enquiry type has been chosen to answer a scientific question. Know that secondary sources can be used to answer scientific questions as well as practical work. Know how to select and use a selection of equipment to measure accurately (ruler, tape measure, trundle wheel, force meter with a suitable scale). Know that to take repeat readings during an enquiry is fair testing. Know that increasing the sample size during an enquiry is pattern seeking. Know that adjusting the observation period and frequency is observing over time. Know that checking further secondary sources is researching. Know how to plan and conduct an enquiry to answer their scientific question/ hypothesis. Know to record observations through annotated photographs, videos, labelled diagrams, observational drawings or writing. Know to record measurements by using tables, tally charts, bar charts, line graphs and scatter graphs. Know to record classifications using tables, Venn diagrams, Carroll diagrams and classification keys.

	Know that the same data can be presented in different ways to help answer the scientific question. Know that predictions are made based on their scientific enquiry knowledge. Know that predictions can be tested using comparative and fair tests. Know how to identify causal relationships and patterns in the natural world from their evidence and how to explain these in a conclusion. Know that results do not always fir the overall pattern and how to explain this in a conclusion. Know how to explain findings using scientific vocabulary in a conclusion. Know how to evaluate the method used, the control of variables, the precision and accuracy of measurements and the credibility of secondary sources used. Know how to identify any limitations that reduce the trust they have in their data. Know that scientific ideas can change due to new evidence that they have gathered. Know how to talk about how new discoveries change scientific understanding. Know how to discuss evidence when answering questions based on observations, measurements taken or information gathered through secondary sources supports or refutes their answer.

Biology	
National Curriculum Objectives	**New Knowledge , Vocabulary and Misconceptions**
Animas inc Humans: • identify and name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood • recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function • describe the ways in which nutrients and water are transported within animals, including humans	Heart, pulse, rate, pumps, blood, blood vessels, transported, lungs, oxygen, carbon dioxide, nutrients, water, muscles, cycle, circulatory system, diet, exercise, drugs, lifestyle Know that the heart pumps blood in the blood vessels around to the lungs. Know that oxygen goes into the blood and carbon dioxide is removed. Know that the blood goes back to the heart and is then pumped around the body. Know that nutrients, water and oxygen are transported in the blood to the muscles and other parts of the body where needed. Know that as muscles are used they produce carbon dioxide and other waste products.

	Know that carbon dioxide is carried by the blood back to the heart and then the cycle starts again as it is transported back to the lungs to be removed from the body. Know how to explain the circulatory. Know that diet, exercise, drugs and lifestyle have an impact on the way our bodies function. Know that diet, exercise, drugs and lifestyle can affect how well our heart and lungs work. Know that diet, exercise, drugs and lifestyle can cause us to suffer health conditions such as diabetes or deficiencies such as lack of vitamins. Know that diet, exercise, drugs and lifestyle can affect how clearly we think, how fit we are and how well we feel. **Misconceptions:** Some children may think: • your heart is on the left side of your chest • the heart makes blood • the blood travels in one loop from the heart to the lungs and around the body • when we exercise, our heart beats faster to work the muscles more • some blood in our bodies is blue and some blood is red • we just eat food for energy • all fat is bad for you • all dairy is good for you • protein is good for you, so you can eat as much as you want • foods only contain fat if you can see it • all drugs are bad for you.

Living Things and Their Habitats: • describe how living things are classified into broad groups according to common observable characteristics and based on similarities and differences, including micro-organisms, plants and animals • give reasons for classifying plants and animals based on specific characteristics	Vertebrates, fish, amphibians, reptiles, birds, mammals, invertebrates, insects, spiders, snails, worms, flowering, non-flowering Know that living things can be formally grouped according to characteristics. Know that plants, animals and micro-organisms are the main groups to be classified. Know that micro-organisms such as bacteria, yeast, toadstools and mushrooms are living things. Know that plants can make their own food whereas animals cannot. Know that animals can be divided into two main groups – those that have backbones (vertebrates) and those that do not (invertebrates). Know that vertebrates can be divided into five small groups – fish, amphibians, reptiles, birds and mammals. Know that invertebrates can be divided into a number of groups including insects, spiders, snails and worms. Know the name of vertebrates and invertebrates and be able to describe common characteristics. Know that plants can be divided in to two main groups (flowering and non-flowering) and be able to name some. Know and can explain the formal classification system devised by Carl Linnaeus. Know how to use first hand observations to identify characteristics shared by animas in a group. **Misconceptions:** Some children may think: • all micro-organisms are harmful • mushrooms are plants.

Evolution and Inheritance: • recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago • recognise that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents • identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution	Offspring, sexual reproduction, vary, characteristics, suited, adapted, environment, inherited, species, fossils Know that all living things have offspring of the same kind. Know that features in the offspring are inherited from the parents. Know that offspring are not identical to their parents and vary from each other due to sexual reproduction. Know that plants and animals have characteristics that make them suited (adapted) to their environment. Know that if the environment changes rapidly some variations of a species may not suit the new environment and will die. Know that if the environment changes slowly, animals and plants with variations that are best suited survive in greater numbers to reproduce and pass their characteristics on to their young. Know that over time inherited characteristics become more dominant within the population. Know that evolution happens over a very long period of time. Know that over time characteristics may be so different to how they were originally that a new species is created – this is evolution. Know that fossils provide evidence of what lived on Earth millions of years ago, supporting the theory of evolution. Know and can explain the process of evolution. **Misconceptions:** Some children may think: • adaptation occurs during an animal's lifetime: giraffes' necks stretch during their lifetime to reach higher leaves and animals living in cold environments grow thick fur during their life • offspring most resemble their parents of the same sex, so that sons look like fathers • all characteristics, including those that are due to actions during the parent's life such as dyed hair or footballing skills, can be inherited • cavemen and dinosaurs were alive at the same time.

Physics	
National Curriculum Objectives	**New Knowledge , Vocabulary and Misconceptions**

Electricity: • associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit • compare and give reasons for variations in how components function, including the brightness of bulbs, the loudness of buzzers and the on/off position of switches • use recognised symbols when representing a simple circuit in a diagram	Circuit, complete circuit, circuit diagram, circuit symbol, cell, battery, bulb, buzzer, motor, switch, voltage Know that adding more cells to a complete circuit will make a bulb brighter. Know that adding more cells to a complete circuit will make a motor spin faster. Know that adding more cells to a complete circuit will make a buzzer make a louder sound. Know that adding more bulbs to a circuit will make each bulb less bright. Know that using more motors or buzzers, each motor will spin more slowly and each buzzer will be quieter. Know that turning a switch off (open) breaks a circuit so the circuit is not complete and electricity cannot flow. Know circuit symbols and can draw simple circuit diagrams. Know how to construct circuits safely. **Misconceptions:** Some children may think: • larger-sized batteries make bulbs brighter • a complete circuit uses up electricity • components in a circuit that are closer to the battery get more electricity.
Light: • recognise that light appears to travel in straight line • use the idea that light travels in straight lines to explain that objects are seen because they give out or reflect light into the eye • explain that we see things because light travels from light sources to our eyes or from light sources to	Straight lines, Light rays, Light, Light source, Dark, Absence of light, Transparent, Translucent, Opaque, Shiny, Matt, Surface, Shadow, Reflect, Mirror, Sunlight. Know that light appears to travel in straight lines. Know that we see objects when light from them goes into our eyes. Know that the light may come directly from light sources. Know that for some objects, light must be reflected from the object into our eyes for the object to be seen. Know that objects that block light (are not fully transparent) will cause shadows.

• objects and then to our eyes use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them	Know that because light travels in straight lines the shape of the shadow will be the same as the outline shape of the object. Know that the size of the shadow is larger when the light source and object move closer to each other as more of the light is blocked. Know that light from sources can be moved, reflected and blocked. **Misconceptions:** Some children may think: • we see objects because light travels from our eyes to the object.