




Broadhempston & Landscove Primary Schools



Years 3&4(LKS2) Science Knowledge Map

Year	3	Topic	Plants
			
<ul style="list-style-type: none"> Identify and describe the functions of different parts of flowering plants: roots; stem/trunk; leaves; and flowers. Explore the requirements of plants for life and growth (air, light, water, nutrients from soil, and room to grow) and how they vary from plant to plant. Investigate the way in which water is transported within plants. Explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal. 			

Prior learning	Future learning
<ul style="list-style-type: none"> Observe and describe how seeds and bulbs grow into mature plants. (Y2 - Plants) Find out and describe how plants need water, light and a suitable temperature to grow and stay healthy. (Y2 - Plants) 	<ul style="list-style-type: none"> Describe the life process of reproduction in some plants and animals. (Y5 - Living things and their habitats) Reproduction in plants, including flower structure, wind and insect pollination, fertilisation, seed and fruit formation and dispersal, including quantitative investigation of some dispersal mechanisms. (KS3)

WHAT PUPILS NEED TO KNOW OR DO TO BE SECURE

Show understanding of a concept using scientific vocabulary correctly

Key learning	Possible evidence
<p>Many plants, but not all, have roots, stems/trunks, leaves and flowers/blossom. The roots absorb water and nutrients from the soil and anchor the plant in place. The stem transports water and nutrients/minerals around the plant and holds the leaves and flowers up in the air to enhance photosynthesis, pollination and seed dispersal. The leaves use sunlight and water to produce the plant's food. Some plants produce flowers which enable the plant to reproduce. Pollen, which is produced by the male part of the flower, is transferred to the female part of other flowers (pollination). This forms seeds, sometimes contained in berries or fruits which are then dispersed in different ways. Different plants require different conditions for germination and growth.</p>	<ul style="list-style-type: none"> Can explain the function of the parts of a flowering plant Can describe the life cycle of flowering plants, including pollination, seed formation, seed dispersal, and germination Can give different methods of pollination and seed dispersal, including examples
Key vocabulary	
<p>Photosynthesis, pollen, insect/wind pollination, seed formation, seed dispersal (wind dispersal, animal dispersal, water dispersal)</p>	


Common 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.

Apply knowledge in familiar related contexts, including a range of enquiries

Activities	Possible evidence
<ul style="list-style-type: none"> • Observe what happens to plants over time when the leaves or roots are removed. • Observe the effect of putting cut white carnations or celery in coloured water. • Investigate what happens to plants when they are put in different conditions e.g. in darkness, in the cold, deprived of air, different types of soil, different fertilisers, varying amount of space. • Spot flowers, seeds, berries and fruits outside throughout the year. • Observe flowers carefully to identify the pollen. • Observe flowers being visited by pollinators e.g. bees and butterflies in the summer. • Observe seeds being blown from the trees e.g. sycamore seeds. • Research different types of seed dispersal. • Classify seeds in a range of ways, including by how they are dispersed. • Create a new species of flowering plant. 	<ul style="list-style-type: none"> • Can explain observations made during investigations • Can look at the features of seeds to decide on their method of dispersal • Can draw and label a diagram of their created flowering plant to show its parts, their role and the method of pollination and seed dispersal

Year	3	Topic	Animals, including humans
			
<ul style="list-style-type: none"> Identify that animals, including humans, need the right types and amount of nutrition, and that they cannot make their own food – they get nutrition from what they eat. Identify that humans and some other animals have skeletons and muscles for support, protection and movement. 			

Prior learning	Future learning
<ul style="list-style-type: none"> Identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals. (Y1 - Animals, including humans) Identify and name a variety of common animals that are carnivores, herbivores and omnivores. (Y1 - Animals, including humans) Describe and compare the structure of a variety of common animals (fish, amphibians, reptiles, birds and mammals, including pets). (Y1 - Animals, including humans) Find out about and describe the basic needs of animals, including humans, for survival (water, food and air). (Y2 - Animals, including humans) Describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene. (Y2 - Animals, including humans) 	<ul style="list-style-type: none"> Describe the simple functions of the basic parts of the digestive system in humans. (Y4 - Animals, including humans) Identify the different types of teeth in humans and their simple functions. (Y4 - Animals, including humans) Construct and interpret a variety of food chains, identifying producers, predators and prey. (Y4 - Animals, including humans) Recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function. (Y6 - Animals, including humans)

WHAT PUPILS NEED TO KNOW OR DO TO BE SECURE	
Show understanding of a concept using scientific vocabulary correctly	
Key learning	Possible evidence
<p>Animals, unlike plants which can make their own food, need to eat in order to get the nutrients they need.</p> <p>Food contains a range of different nutrients – carbohydrates (including sugars), protein, vitamins, minerals, fats, sugars, water – and fibre that are needed by the body to stay healthy. A piece of food will often provide a range of nutrients.</p> <p>Humans, and some other animals, have skeletons and muscles which help them move and provide protection and support.</p>	<ul style="list-style-type: none"> Can name the nutrients found in food Can state that to be healthy we need to eat the right types of food to give us the correct amount of these nutrients

Key vocabulary	
Nutrition, nutrients, carbohydrates, sugars, protein, vitamins, minerals, fibre, fat, water, skeleton, bones, muscles, joints, support, protect, move, skull, ribs, spine	
Common misconceptions	
Some children may think:	
<ul style="list-style-type: none"> • 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. 	
Apply knowledge in familiar related contexts, including a range of enquiries	
Activities	Possible evidence
<ul style="list-style-type: none"> • Classify food in a range of ways. • Use food labels to explore the nutritional content of a range of food items. • Use secondary sources to find out the types of food that contain the different nutrients. • Use food labels to answer enquiry questions e.g. How much fat do different types of pizza contain? How much sugar is in soft drinks? • Plan a daily diet to contain a good balance of nutrients. • Explore the nutrients contained in fast food. • Use secondary sources to research the parts and functions of the skeleton. • Investigate patterns asking questions such as: <ul style="list-style-type: none"> ▪ Can people with longer legs run faster? ▪ Can people with bigger hands catch a ball better? • Compare, contrast and classify skeletons of different animals. 	<ul style="list-style-type: none"> • Can name some bones that make up their skeleton, giving examples that support, help them move or provide protection • Can describe how muscles and joints help them to move • Can classify food into those that are high or low in particular nutrients • Can answer their questions about nutrients in food, based on their gathered evidence • Can talk about the nutrient content of their daily plan • Use their data to look for patterns (or lack of them) when answering their enquiry question • Can give similarities e.g. they all have joints to help the animal move, and differences between skeletons



Year	3	Topic	Rocks
			<ul style="list-style-type: none"> • Compare and group together different kinds of rocks on the basis of their appearance and simple physical properties. • Describe in simple terms how fossils are formed when things that have lived are trapped within rock. • Recognise that soils are made from rocks and organic matter.

Prior learning	Future learning
<ul style="list-style-type: none"> • Distinguish between an object and the material from which it is made. (Y1 - Everyday materials) • Identify and name a variety of everyday materials, including wood, plastic, glass, metal, water, and rock. (Y1 - Everyday materials) • Describe the simple physical properties of a variety of everyday materials. (Y1 - Everyday materials) • Compare and group together a variety of everyday materials on the basis of their simple physical properties. (Y1 - 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. (Y2 - Uses of everyday materials) 	<ul style="list-style-type: none"> • Recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago. (Y6 - Evolution and inheritance) • The composition of the Earth. (KS3) • The structure of the Earth. (KS3) • The rock cycle and the formation of igneous, sedimentary and metamorphic rocks. (KS3)

WHAT PUPILS NEED TO KNOW OR DO TO BE SECURE	
Show understanding of a concept using scientific vocabulary correctly	
Key learning	Possible evidence
<p>Rock is a naturally occurring material. There are different types of rock e.g. sandstone, limestone, slate etc. which have different properties. Rocks can be hard or soft. They have different sizes of grain or crystal. They may absorb water. Rocks can be different shapes and sizes (stones, pebbles, boulders). Soils are made up of pieces of ground down rock which may be mixed with plant and animal material (organic matter). The type of rock, size of rock pieces and the amount of organic matter affect the property of the soil.</p> <p>Some rocks contain fossils. Fossils were formed millions of years ago. When plants and animals died, they fell to the seabed. They became covered and squashed by other material. Over time the dissolving animal and plant matter is replaced by minerals from the water.</p>	<ul style="list-style-type: none"> • Can name some types of rock and give physical features of each • Can explain how a fossil is formed • Can explain that soils are made from rocks and also contain living/dead matter

Key vocabulary	
Rock, stone, pebble, boulder, grain, crystals, layers, hard, soft, texture, absorb water, soil, fossil, marble, chalk, granite, sandstone, slate, soil, peat, sandy/chalk/clay soil	
Common misconceptions	
Some children may think: <ul style="list-style-type: none"> 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. 	
Apply knowledge in familiar related contexts, including a range of enquiries	
Activities	Possible evidence
<ul style="list-style-type: none"> Observe rocks closely. Classify rocks in a range of ways, based on their appearance. Devise a test to investigate the hardness of a range of rocks. Devise a test to investigate how much water different rocks absorb. Observe how rocks change over time e.g. gravestones or old building. Research using secondary sources how fossils are formed. Observe soils closely. Classify soils in a range of ways based on their appearance. Devise a test to investigate the water retention of soils. Observe how soil can be separated through sedimentation. Research the work of Mary Anning. 	<ul style="list-style-type: none"> Can classify rocks in a range of different ways, using appropriate vocabulary Can devise tests to explore the properties of rocks and use data to rank the rocks Can link rocks changing over time with their properties e.g. soft rocks get worn away more easily Can present in different ways their understanding of how fossils are formed e.g. in role play, comic strip, chronological report, stop-go animation etc. Can identify plant/animal matter and rocks in samples of soil Can devise a test to explore the water retention of soils



Year	3	Topic	Light
			<ul style="list-style-type: none"> • Recognise that they need light in order to see things, and that dark is the absence of light. • Notice that light is reflected from surfaces. • Recognise that light from the sun can be dangerous and that there are ways to protect their eyes. • Recognise that shadows are formed when the light from a light source is blocked by an opaque object. • Find patterns in the way that the size of shadows change.

Prior learning	Future learning
<ul style="list-style-type: none"> • Explore how things work. (Nursery – Light) • Talk about the differences in materials and changes they notice. (Nursery – Light) • Describe what they see, hear and feel whilst outside. (Reception – Light) • Identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense. (Y1 - Animals, including humans) • Describe the simple physical properties of a variety of everyday materials. (Y1 - Materials) 	<ul style="list-style-type: none"> • Recognise that light appears to travel in straight lines. (Y6 - Light) • 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. (Y6 - Light) • 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. (Y6 - Light) • Use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them. (Y6 - Light)

WHAT PUPILS NEED TO KNOW OR DO TO BE SECURE	
Show understanding of a concept using scientific vocabulary correctly	
Key learning	Possible evidence
<p>We see objects because our eyes can sense light. Dark is the absence of light. We cannot see anything in complete darkness. Some objects, for example, the sun, light bulbs and candles are sources of light. Objects are easier to see if there is more light. Some surfaces reflect light. Objects are easier to see when there is less light if they are reflective.</p> <p>The light from the sun can damage our eyes and therefore we should not look directly at the sun and can protect our eyes by wearing sunglasses or sunhats in bright light.</p> <p>Shadows are formed on a surface when an opaque or translucent object is between a light source and the surface and blocks some of the light. The size of the shadow depends on the position of the source, object and surface.</p>	<ul style="list-style-type: none"> • Can describe how we see objects in light and can describe dark as the absence of light • Can state that it is dangerous to view the sun directly and state precautions used to view the sun, for example in eclipses • Can define transparent, translucent and opaque • Can describe how shadows are formed

Key vocabulary

Light, light source, dark, absence of light, transparent, translucent, opaque, shiny, matt, surface, shadow, reflect, mirror, sunlight, dangerous

Common 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.

Apply knowledge in familiar related contexts, including a range of enquiries

Activities

- Explore how different objects are more or less visible in different levels of lighting.
- Explore how objects with different surfaces, e.g. shiny vs matt, are more or less visible.
- Explore how shadows vary as the distance between a light source and an object or surface is changed.
- Explore shadows which are connected to and disconnected from the object e.g. shadows of clouds and children in the playground.
- Choose suitable materials to make shadow puppets.
- Create artwork using shadows.

Possible evidence

- Can describe patterns in visibility of different objects in different lighting conditions and predict which will be more or less visible as conditions change
- Can clearly explain, giving examples, that objects are not visible in complete darkness
- Can describe and demonstrate how shadows are formed by blocking light
- Can describe, demonstrate and make predictions about patterns in how shadows vary



Year	3	Topic	Forces and magnets
<ul style="list-style-type: none"> • Compare how things move on different surfaces. • Notice that some forces need contact between two objects, but magnetic forces can act at a distance. • Observe how magnets attract or repel each other and attract some materials and not others. • Compare and group together a variety of everyday materials on the basis of whether they are attracted to a magnet, and identify some magnetic materials. • Describe magnets as having two poles. • Predict whether two magnets will attract or repel each other, depending on which poles are facing. 			

Prior learning	Future learning
<ul style="list-style-type: none"> • Explore how things work. (Nursery – Forces) • Explore and talk about different forces they can feel. (Nursery – Forces) • Talk about the differences between materials and changes they notice. (Nursery – Forces) • Explore the natural world around them. (Reception – Forces) • Describe what they see, hear and feel whilst outside. (Reception – Forces) • Find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching. (Y2 - Uses of everyday materials) 	<ul style="list-style-type: none"> • Explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object. (Y5 - Forces) • Identify the effects of air resistance, water resistance and friction, that act between moving surfaces. (Y5 - Forces) • Recognise that some mechanisms, including levers, pulleys and gears, allow a smaller force to have a greater effect. (Y5 - Forces) • Magnetic fields by plotting with compass, representation by field lines. (KS3) • Earth's magnetism, compass and navigation. (KS3)

WHAT PUPILS NEED TO KNOW OR DO TO BE SECURE

Show understanding of a concept using scientific vocabulary correctly	
Key learning	Possible evidence
<p>A force is a push or a pull. When an object moves on a surface, the texture of the surface and the object affect how it moves. It may help the object to move better or it may hinder its movement e.g. ice skater compared to walking on ice in normal shoes.</p> <p>A magnet attracts magnetic material. Iron and nickel and other materials containing these, e.g. stainless steel, are magnetic. The strongest parts of a magnet are the poles. Magnets have two poles – a north pole and a south pole. If two like poles, e.g. two north poles, are brought together they will push away from each other – repel. If two unlike poles, e.g. a north and south, are brought together they will pull together – attract.</p>	<ul style="list-style-type: none"> • Can give examples of forces in everyday life • Can give examples of objects moving differently on different surfaces • Can name a range of types of magnets and show how the poles attract and repel • Can draw diagrams using arrows to show the attraction and repulsion between the poles of magnets

For some forces to act, there must be contact e.g. a hand opening a door, the wind pushing the trees. Some forces can act at a distance e.g. magnetism. The magnet does not need to touch the object that it attracts.

Key vocabulary

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


Common misconceptions

Some children may think:

- the bigger the magnet the stronger it is
- all metals are magnetic.

Apply knowledge in familiar related contexts, including a range of enquiries

Activities	Possible evidence
<ul style="list-style-type: none"> • Carry out investigations to explore how objects move on different surfaces e.g. spinning tops/coins, rolling balls/cars, clockwork toys, soles of shoes etc. • Explore what materials are attracted to a magnet. • Classify materials according to whether they are magnetic. • Explore the way that magnets behave in relation to each other. • Use a marked magnet to find the unmarked poles on other types of magnets. • Explore how magnets work at a distance e.g. through the table, in water, jumping paper clips up off the table. • Devise an investigation to test the strength of magnets. 	<ul style="list-style-type: none"> • Can use their results to describe how objects move on different surfaces • Can use their results to make predictions for further tests e.g. it will spin for longer on this surface than that, but not as long as it spun on that surface • Can use classification evidence to identify that some metals, but not all, are magnetic • Through their exploration, they can show how like poles repel and unlike poles attract, and name unmarked poles • Can use test data to rank magnets

Year	4	Topic	Living things and their habitats
			
<ul style="list-style-type: none"> • 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. 			

Prior learning	Future learning
<ul style="list-style-type: none"> • Identify and name a variety of common wild and garden plants, including deciduous and evergreen trees. (Y1 - Plants) • Identify and describe the basic structure of a variety of common flowering plants, including trees. (Y1 - Plants) • Identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals. (Y1 - Animals including humans) • Describe and compare the structure of a variety of common animals (fish, amphibians, reptiles, birds and mammals, including pets). (Y1 – Animals, including humans) • Identify and name a variety of plants and animals in their habitats, including microhabitats. (Y2 - Living things and their habitats) 	<ul style="list-style-type: none"> • Describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird. (Y5 - Living things and their habitats) • Describe the life process of reproduction in some plants and animals. (Y5 - 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 microorganisms, plants and animals. (Y6 - Living things and their habitats) • Give reasons for classifying plants and animals based on specific characteristics. (Y6 - Living things and their habitats)

WHAT PUPILS NEED TO KNOW OR DO TO BE SECURE	
Show understanding of a concept using scientific vocabulary correctly	
Key learning	Possible evidence
<p>Living things can be grouped (classified) in different ways according to their features. Classification keys can be used to identify and name living things.</p> <p>Living things live in a habitat which provides an environment to which they are suited (Year 2 learning). These environments may change naturally e.g. through flooding, fire, earthquakes etc. Humans also cause the environment to change. This can be in a good way (i.e. positive human impact, such as setting up nature reserves) or in a bad way (i.e. negative human impact, such as littering). These environments also change with the seasons; different living things can be found in a habitat at different times of the year.</p>	<ul style="list-style-type: none"> • Can name living things living in a range of habitats, giving the key features that helped them to identify them • Can give examples of how an environment may change both naturally and due to human impact

Key vocabulary

Classification, classification keys, environment, habitat, human impact, positive, negative, migrate, hibernate

Common 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.

Apply knowledge in familiar related contexts, including a range of enquiries

Activities

- Observe plants and animals in different habitats throughout the year.
- Compare and contrast the living things observed.
- Use classification keys to name unknown living things.
- Classify living things found in different habitats based on their features.
- Create a simple identification key based on observable features.
- Use fieldwork to explore human impact on the local environment e.g. litter, tree planting.
- Use secondary sources to find out about how environments may naturally change.
- Use secondary sources to find out about human impact, both positive and negative, on environments.

Possible evidence

- Can keep a careful record of living things found in different habitats throughout the year (diagrams, tally charts etc.)
- Can use classification keys to identify unknown plants and animals
- Can present their learning about changes to the environment in different ways e.g. campaign video, persuasive letter



Year	4	Topic	Animals, including humans
			<ul style="list-style-type: none"> 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.

Prior learning	Future learning
<ul style="list-style-type: none"> Identify and name a variety of common animals that are carnivores, herbivores and omnivores. (Y1 - Animals, including humans) Find out about and describe the basic needs of animals, including humans, for survival (water, food and air). (Y2 - Animals, including humans) Describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene. (Y2 - Animals, including 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. (Y3 - Animals, including humans) 	<ul style="list-style-type: none"> Identify and name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood. (Y6 - Animals, including humans) Recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function. (Y6 - Animals, including humans) Describe the ways in which nutrients and water are transported within animals, including humans. (Y6 - Animals, including humans)

WHAT PUPILS NEED TO KNOW OR DO TO BE SECURE	
Show understanding of a concept using scientific vocabulary correctly	
Key learning	Possible evidence
<p>Food enters the body through the mouth. Digestion starts when the teeth start to break the food down. Saliva is added and the tongue rolls the food into a ball. The food is swallowed and passes down the oesophagus to the stomach. Here the food is broken down further by being churned around and other chemicals are added.</p> <p>The food passes into the small intestine. Here nutrients are removed from the food and leave the digestive system to be used elsewhere in the body. The rest of the food then passes into the large intestine. Here the water is removed for use elsewhere in the body. What is left is then stored in the rectum until it leaves the body through the anus when you go to the toilet.</p> <p>Humans have four types of teeth: incisors for cutting; canines for tearing; and molars and premolars for grinding (chewing).</p>	<ul style="list-style-type: none"> Can sequence the main parts of the digestive system Can draw the main parts of the digestive system onto a human outline Can describe what happens in each part of the digestive system Can point to the three different types of teeth in their mouth and talk about their shape and what they are used for Can name producers, predators and prey within a habitat

Living things can be classified as producers, predators and prey according to their place in the food chain.

- Can construct food chains

Key vocabulary

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


Common 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".

Apply knowledge in familiar related contexts, including a range of enquiries

Activities	Possible evidence
<ul style="list-style-type: none"> • Research the function of the parts of the digestive system. • Create a model of the digestive system using household objects. • Explore eating different types of food to identify which teeth are being used for cutting, tearing and grinding (chewing). • Classify animals as herbivores, carnivores or omnivores according to the type of teeth they have in their skulls. • Use food chains to identify producers, predators and prey within a habitat. • Use secondary sources to identify animals in a habitat and find out what they eat. 	<ul style="list-style-type: none"> • Can use diagrams or a model to describe the journey of food through the body explaining what happens in each part • Can record the teeth in their mouth (make a dental record) • Can explain the role of the different types of teeth • Can explain how the teeth in animal skulls show they are carnivores, herbivores or omnivores • Can create food chains based on research

Year	4	Topic	States of matter
			
<ul style="list-style-type: none"> • 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. 			

Prior learning	Future learning
<ul style="list-style-type: none"> • Distinguish between an object and the material from which it is made. (Y1 - Everyday materials) • Identify and name a variety of everyday materials, including wood, plastic, glass, metal, water, and rock. (Y1 - Everyday materials) • Describe the simple physical properties of a variety of everyday materials. (Y1 - Everyday materials) • Compare and group together a variety of everyday materials on the basis of their simple physical properties. (Y1 - 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. (Y2 - Uses of everyday materials) • Find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching. (Y2 - Uses of everyday materials) 	<ul style="list-style-type: none"> • Compare and group together everyday materials on the basis of their properties, including their hardness, solubility, transparency, conductivity (electrical and thermal), and response to magnets. (Y5 - Properties and changes of materials) • Know that some materials will dissolve in liquid to form a solution, and describe how to recover a substance from a solution. (Y5 - Properties and changes of materials) • Use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating. (Y5 - Properties and changes of materials) • Give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic. (Y5 - Properties and changes of materials) • Demonstrate that dissolving, mixing and changes of state are reversible changes. (Y5 - Properties and changes of materials) • 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. (Y5 - Properties and changes of materials)

Show understanding of a concept using scientific vocabulary correctly

Key learning	Possible evidence
<p>A solid keeps its shape and has a fixed volume. A liquid has a fixed volume but changes in shape to fit the container. A liquid can be poured and keeps a level, horizontal surface. A gas fills all available space; it has no fixed shape or volume. Granular and powdery solids like sand can be confused with liquids because they can be poured, but when poured they form a heap and they do not keep a level surface when tipped. Each individual grain demonstrates the properties of a solid.</p> <p>Melting is a state change from solid to liquid. Freezing is a state change from liquid to solid. The freezing point of water is 0°C. Boiling is a change of state from liquid to gas that happens when a liquid is heated to a specific temperature and bubbles of the gas can be seen in the liquid. Water boils when it is heated to 100°C. Evaporation is the same state change as boiling (liquid to gas), but it happens slowly at lower temperatures and only at the surface of the liquid. Evaporation happens more quickly if the temperature is higher, the liquid is spread out or it is windy. Condensation is the change back from a gas to a liquid caused by cooling.</p> <p>Water at the surface of seas, rivers etc. evaporates into water vapour (a gas). This rises, cools and condenses back into a liquid forming clouds. When too much water has condensed, the water droplets in the cloud get too heavy and fall back down as rain, snow, sleet etc. and drain back into rivers etc. This is known as precipitation. This is the water cycle.</p>	<ul style="list-style-type: none"> • Can create a concept map, including arrows linking the key vocabulary • Can name properties of solids, liquids and gases • Can give everyday examples of melting and freezing • Can give everyday examples of evaporation and condensation • Can describe the water cycle
<p>Key vocabulary</p> <p>Solid, liquid, gas, state change, melting, freezing, melting point, boiling point, evaporation, temperature, water cycle</p>	
<p>Common misconceptions</p>	
<p>Some children may think:</p> <ul style="list-style-type: none"> • '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.

Apply knowledge in familiar related contexts, including a range of enquiries

Activities	Possible evidence
<ul style="list-style-type: none"> • Observe closely and classify a range of solids. Observe closely and classify a range of liquids. • Explore making gases visible e.g. squeezing sponges under water to see bubbles, and showing their effect e.g. using straws to blow objects, trees moving in the wind. • Classify materials according to whether they are solids, liquids and gases. • Observe a range of materials melting e.g. ice, chocolate, butter. • Investigate how to melt ice more quickly. • Observe the changes when making rocky road cakes or ice-cream. • Investigate the melting point of different materials e.g. ice, margarine, butter and chocolate. • Explore freezing different liquids e.g. tomato ketchup, oil, shampoo. • Use a thermometer to measure temperatures e.g. icy water (melting), tap water, hot water, boiling water (demonstration). • Observe water evaporating and condensing e.g. on cups of icy water and hot water. • Set up investigations to explore changing the rate of evaporation e.g. washing, puddles, handprints on paper towels, liquids in containers. • Use secondary sources to find out about the water cycle. 	<ul style="list-style-type: none"> • Can give reasons to justify why something is a solid liquid or gas • Can give examples of things that melt/freeze and how their melting points vary • From their observations, can give the melting points of some materials • Using their data, can explain what affects how quickly a solid melts • Can measure temperatures using a thermometer • Can explain why there is condensation on the inside the hot water cup but on the outside of the icy water cup • From their data, can explain how to speed up or slow down evaporation • Can present their learning about the water cycle in a range of ways e.g. diagrams, explanation text, story of a water droplet



Year	4	Topic	Sound
<ul style="list-style-type: none"> • 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. 			


Prior learning	Future learning
<ul style="list-style-type: none"> • Explore how things work. (Nursery – Sound) • Describe what they see, hear and feel whilst outside. (Reception – Sound) • Identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense. (Y1 - Animals, including humans) 	<ul style="list-style-type: none"> • Waves on water as undulations which travel through water with transverse motion; these waves can be reflected, and add or cancel – superposition. (KS3) • Frequencies of sound waves, measured in Hertz (Hz); echoes, reflection and absorption of sound. (KS3) • Sound needs a medium to travel, the speed of sound in air, in water, in solids. (KS3) • Sound produced by vibrations of objects, in loud speakers, detected by their effects on microphone diaphragm and the ear drum; sound waves are longitudinal. (KS3) • Auditory range of humans and animals. (KS3) • Pressure waves transferring energy; use for cleaning and physiotherapy by ultra-sound. (KS3) • Waves transferring information for conversion to electrical signals by microphone. (KS3)

WHAT PUPILS NEED TO KNOW OR DO TO BE SECURE

Show understanding of a concept using scientific vocabulary correctly

Key learning	Possible evidence
<p>A sound produces vibrations which travel through a medium from the source to our ears. Different mediums such as solids, liquids and gases can carry sound, but sound cannot travel through a vacuum (an area empty of matter). The vibrations cause parts of our body inside our ears to vibrate, allowing us to hear (sense) the sound.</p> <p>The loudness (volume) of the sound depends on the strength (size) of vibrations which decreases as they travel through the medium. Therefore, sounds decrease in volume as you move away from the source. A sound insulator is a material which blocks sound effectively.</p> <p>Pitch is the highness or lowness of a sound and is affected by features of objects producing the sounds. For example, smaller objects usually produce higher pitched sounds.</p> <p>Key vocabulary</p> <p>Sound, source, vibrate, vibration, travel, pitch (high, low), volume, faint, loud, insulation</p>	<ul style="list-style-type: none"> • Can name sound sources and state that sounds are produced by the vibration of the object • Can state that sounds travel through different mediums such as air, water, metal • Can give examples to demonstrate how the pitch of a sound are linked to the features of the object that produced it • Can give examples of how to change the volume of a sound e.g. increase the size of vibrations by hitting or blowing harder • Can give examples to demonstrate that sounds get fainter as the distance from the sound source increases
Common misconceptions	
<p>Pitch and volume are frequently confused, as both can be described as high or low.</p> <p>Some children may think:</p> <ul style="list-style-type: none"> • 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 loud and low sounds are quiet. 	
Apply knowledge in familiar related contexts, including a range of enquiries	
<p>Activities</p> <ul style="list-style-type: none"> • Classify sound sources. • Explore making sounds with a range of objects, such as musical instruments and other household objects. • Explore how string telephones or ear gongs work. • Explore altering the pitch or volume of objects, such as the length of a guitar string, amount of water in bottles, size of tuning forks. • Measure sounds over different distances. • Measure sounds through different insulation materials. 	<p>Possible evidence</p> <ul style="list-style-type: none"> • Can explain what happens when you strike a drum or pluck a string and use a diagram to show how sounds travel from an object to the ear • Can demonstrate how to increase or decrease pitch and volume using musical instruments or other objects • Can use data to identify patterns in pitch and volume

- Can explain how loudness can be reduced by moving further from the sound source or by using a sound insulating medium

Year	4	Topic	Electricity
			
<ul style="list-style-type: none"> 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. 			

Prior learning	Future learning
<ul style="list-style-type: none"> Explore how things work. (Nursery - Electricity) 	<ul style="list-style-type: none"> Associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit. (Y6 - Electricity) 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. (Y6 - Electricity) Use recognised symbols when representing a simple circuit in a diagram. (Y6 - Electricity)

WHAT PUPILS NEED TO KNOW OR DO TO BE SECURE	
Show understanding of a concept using scientific vocabulary correctly	
Key learning	Possible evidence
<p>Many household devices and appliances run on electricity. Some plug in to the mains and others run on batteries. An electrical circuit consists of a cell or battery connected to a component using wires. If there is a break in the circuit, a loose connection or a short circuit, the component will not work. A switch can be added to the circuit to turn the component on and off.</p> <p>Metals are good conductors so they can be used as wires in a circuit. Non-metallic solids are insulators except for graphite (pencil lead). Water, if not completely pure, also conducts electricity.</p>	<ul style="list-style-type: none"> Can name the components in a circuit Can make electric circuits Can control a circuit using a switch Can name some metals that are conductors Can name materials that are insulators

Key vocabulary

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

N.B.

Children in Year 4 do not need to use standard symbols for electrical components, as this is taught in Year 6.

Common 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.

Apply knowledge in familiar related contexts, including a range of enquiries

Activities	Possible evidence
<ul style="list-style-type: none"> • Construct a range of circuits. • Explore which materials can be used instead of wires to make a circuit. • Classify the materials that were suitable/not suitable for wires. • Explore how to connect a range of different switches and investigate how they function in different ways. • Choose switches to add to circuits to solve particular problems, such as a pressure switch for a burglar alarm. • Apply their knowledge of conductors and insulators to design and make different types of switch. • Make circuits that can be controlled as part of a DT project. <p>N.B. Children should be given one component at a time to add to circuits.</p>	<ul style="list-style-type: none"> • Can communicate structures of circuits using drawings which show how the components are connected • Use classification evidence to identify that metals are good conductors and non-metals are insulators • Can incorporate a switch into a circuit to turn it on and off • Can connect a range of different switches identifying the parts that are insulators and conductors • Can add a circuit with a switch to a DT project and can demonstrate how it works • Can give reasons for choice of materials for making different parts of a switch • Can describe how their switch works