



Science

Progression of Knowledge and Skills Document

KEY

Red: Eatock Curriculum

Green: LOTC

Written 2019 - 2020

Purpose of Science at Eatock

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

Aims

At Eatock Primary School the primary aim of our Science studies is to ignite curiosity in our children; we want them to question why things happen and the way things work.

The 2014 National Curriculum for Science aims to ensure that all children:

- develop scientific knowledge and conceptual understanding through the specific disciplines of biology, chemistry and physics.
- develop understanding of the nature, processes and methods of science through different types of science enquiries that help them to answer scientific questions about the world around them.
- are equipped with the scientific skills required to understand the uses and implications of science, today and for the future. We understand that it is important for lessons to have a skills-based focus, and that the knowledge can be taught through this.

At Eatock Primary School we know that children are naturally curious and we encourage this inquisitive nature throughout their time with us and beyond. Science fosters a healthy inquisitiveness in children about our universe and promotes respect for the natural and life sciences. We believe science encompasses the acquisition of knowledge, concepts, skills and positive attitudes. We ensure that the Working Scientifically skills are built-on and developed throughout their school career so that they can use equipment, conduct experiments, build arguments and explain concepts confidently and continue to ask questions and be curious about their surroundings.

Scientific knowledge and conceptual understanding

The programmes of study describe a sequence of knowledge and concepts. While it is important that pupils make progress, it is also vitally important that they develop secure understanding of each key block of knowledge and concepts in order to progress to the next stage. Insecure, superficial understanding will not allow genuine progression: pupils may struggle at key points of transition (such as between primary and secondary school), build up serious misconceptions, and/or have significant difficulties in understanding higher-order content.

Pupils should be able to describe associated processes and key characteristics in common language, but they should also be familiar with, and use, technical terminology accurately and precisely. They should build up an extended specialist vocabulary. They should also apply their mathematical knowledge to their understanding of science, including collecting, presenting and analysing data. The social and economic implications of science are important but, generally, they are taught most appropriately within the wider school curriculum: teachers will wish to use different contexts to maximise their pupils' engagement with and motivation to study science.

By the end of each key stage, pupils are expected to know, apply and understand the matters, skills and processes specified in the relevant programme of study.

Overview of Science

	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
Year 1 David Attenborough	Everyday Materials	Animals including humans	Animals including humans	Animals including humans / Plants	Plants	Seasonal Changes
Year 2 Charles Mackintosh	Living things and their habitat	Uses of everyday Materials	Animals including humans	Plants	Plants	Animals including humans
Year 3 Mary Anning	Forces and magnets	Light	Rocks	Rocks	Animals including humans	Plants
Year 4 Alexander Graham Bell	Living things and their habitat	Animals including humans	States of Matter	States of Matter	Sound	Electricity
Year 5 Isaac Newton	Living things and their habitats	Properties and change of materials	Forces	Forces	Earth and Space	Animals including humans
Year 6 Thomas Edison	Living things and their habitat	Evolution and inheritance	Evolution and inheritance	Animals including humans	Light	Electricity

Guidance for teachers

	Year	1	Topic	
Within this section you will find the Unit of Work heading, along with the National Curriculum objectives.				

Prior learning	Building on prior learning
Before starting to teach this unit of work, teachers will need to plan a lesson to assess the children's prior knowledge. This 'Prior learning' box provides an overview of what the children have been previously taught and therefore should know. Teachers should use this as a starting point and plan a lesson, ideally a rotation of activities that match the descriptions (key themes) listed in this Prior learning box, to identify gaps in prior learning and to provide an opportunity to revisit the prior learning. Where gaps are identified, address these before completing this unit of work through a refresher lesson or lesson starter tasks.	This section identifies future learning that will take place beyond this year group's teaching. This informs teachers of the learning journey that the children will take within this unit of work, e.g. Plants, i.e. and identifies key objectives that children will be taught to build upon the teaching taken place in this unit.

WHAT PUPILS NEED TO KNOW OR DO TO BE SECURE	
Show understanding of a concept using scientific vocabulary correctly	
Key learning	Formative Assessment
This section identifies the key learning that will take place within this unit (NC).	Teachers will use this guidance to make on-going formative assessments whilst teaching this unit of work. These assessments will contribute to the summative assessment task (see below) to make the final assessment for this unit of work (for each pupil in their class).
Scientific vocabulary	

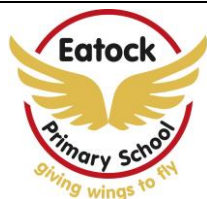
Scientific vocabulary taken from NC, subject leader and teacher input. This vocabulary will be referred to whilst teaching this unit and will be displayed on the classroom Working Wall when appropriate.

Common misconceptions	
This section identifies common misconceptions that their children may have whilst teaching this unit of work. Teachers must be aware of these and ensure all misconceptions are addressed whilst teaching this unit of work.	
Apply knowledge in familiar related contexts, including a range of enquiries	
Lessons	Summative Assessment
These lessons are question based. Teachers will share the question with the children at the start of the lesson and teach the WALTs through the lesson. Teachers will use the key questions to develop a Science Working Wall in their classroom. This will include: the key question (of the lesson) along with some of the learning taught through your WALTs (ensuring full coverage), key vocabulary, examples of children's work or a concrete object, such as a leaf, to promote scientific discussion. The teacher will refer to the Working Wall at the start of the next lesson to recap on and consolidate the learning has taken place within this unit of work. These key questions may take a series of lessons to complete (identified through WALTs).	Key objectives (KPIs) are identified within this section. Teachers will use these key objectives to plan a summative assessment task and use the evidence gathered from this task (along with their formative assessments) to make an end of unit assessment for each child in their class. During the assessment task, an input or recap on skills and knowledge taught must not be provided.

EYFS

Early Learning Goals





EYFS

Key Learning

Plants

Children know about similarities and differences in relation to places, objects, materials and living things. They talk about the features of their own immediate environment and how environments might vary from one another. They make observations of animals and plants and explain why some things occur and talk about changes. (Early Learning Goal)

Animals including Humans

Children know about similarities and differences in relation to places, objects, materials and living things. They talk about the features of their own immediate environment and how environments might vary from one another. They make observations of animals and plants and explain why some things occur and talk about changes. (Early Learning Goal)

Everyday Materials

Children know about similarities and differences in relation to places, objects, materials and living things. They talk about the features of their own immediate environment and how environments might vary from one another. They make observations of animals and plants and explain why some things occur and talk about changes. (Early Learning Goal)

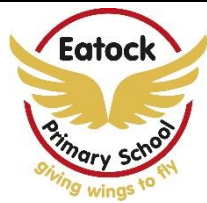
Seasonal Changes

Children know about similarities and differences in relation to places, objects, materials and living things. They talk about the features of their own immediate environment and how environments might vary from one another. They make observations of animals and plants and explain why some things occur and talk about changes. (Early Learning Goal)

Year 1

Science progression of knowledge and skills grid





Year	1	Topic	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.		

Prior learning	Future learning
Understand some important processes and changes in the natural world around them, including the seasons and changing states of matter (Early Learning Goal) Explore the natural world around them (Early Learning Goal) <u>Nursery</u> Explore materials in everyday situations Name a few materials Begin to talk about their properties Use observational skills to talk about the changes they observe ie - when cooking... <u>Reception</u> Name a small selection of materials and talk about their properties Recognise and describe some changes of state ie- freezing and melting	- 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)

WHAT PUPILS NEED TO KNOW OR DO TO BE SECURE	
Show understanding of a concept using scientific vocabulary correctly	
Key learning	Formative Assessment
- All objects are made of one or more materials. Some objects can be made from different materials e.g. plastic, metal or wooden spoons. - Materials can be described by their properties e.g. shiny, stretchy, rough etc. Some materials e.g. plastic can be in different forms with very different properties.	- Can label a picture or diagram of an object made from different materials - Can describe the properties of different materials
Scientific vocabulary	

Object, material, wood, plastic, glass, metal, water, rock, brick, paper, fabric, elastic, foil, card/cardboard, rubber, wool, clay, hard, soft, stretchy, stiff, bendy, floppy, waterproof, absorbent, not absorbent, rough, smooth, shiny, dull, see-through (transparent) , not see-through (opaque)	
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Common 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.	
Apply knowledge in familiar related contexts, including a range of enquiries	
Lessons	Summative Assessment
Key Question: Can we sort materials? (Identifying and classifying) WALT classify objects made of one material in different ways e.g. a group of object made of metal. WALT classify in different ways one type of object made from a range of materials e.g. a collection of spoons made of different materials. Key Question: Which superhero transport will float and sink? (Identifying and Classifying) WALT make a product that floats. WALT classify materials based on their properties. Key Question: Which materials are best for a superhero costume? (Comparative test) WALT test the properties of objects e.g. absorbency of cloths, strength of party hats made of different papers, stiffness of paper plates, waterproofness of shelters. Key Question: What materials can be recycled? (Research) WALT identify materials that can be recycled.	• Can sort objects and materials using a range of properties • Can choose an appropriate method for testing an object for a particular property • Can use their test evidence to answer the questions about properties e.g. "Which cloth is the most absorbent?"
Scientific enquiry elements covered during this topic:	
• Classifying and Identifying • Research • Comparative tests	

	Year - 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.	1	Topic	Animals including humans
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Prior learning	Future learning
• Explore the natural world around them, making observations and drawing pictures of animals and plants (ELG) <u>Nursery</u> Use all their senses to explore (investigational and observational skills) Name main body parts Identify and name a small range of woodland animals Identify and name a small range of mini beasts Identify some creatures that live on land and some that live in water(river, sea, pond) Identify a few differences and similarities between humans Know that we live on planet Earth Identify a few ways in which they keep their body healthy (exercise, diet and hygiene) <u>Reception</u> Identify family members and talk about their appearance Identify some physical differences and similarities between humans Identify and name a small range of woodland animals and their habitats Talk about ways in which we care for and respect animals and humans Identify at least one animal that lives in the Arctic and Antarctic Sequence a life cycle of a chicken or frog Label some features of a mini beast Identify some body parts and their function	- 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. (Y2 - 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)

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WHAT PUPILS NEED TO KNOW OR DO TO BE SECURE

Show understanding of a concept using scientific vocabulary correctly

Key learning	Formative Assessment
Animals vary in many ways having different structures and have different skin coverings. Animals eat certain things. Humans have key parts in common, but these vary from person to person. Humans (and other animals) find out about the world using their senses. Humans have five senses – sight, touch, taste, hearing and smelling. These senses are linked to particular parts of the body.	• Can name a range of animals which includes animals from each of the vertebrate groups • Can describe the key features of these named animals • Can label key features on a picture/diagram • Can write descriptively about an animal • Can describe what a range of animals eat • During PE lessons, can follow instructions involving parts of the body • Can label parts of the body on pictures and diagrams • Can explore objects using senses
Scientific vocabulary • Head, body, eyes, ears, mouth, teeth, leg, tail, wing, claw, fin, scales, feathers, fur, beak, paws, hooves, omnivore, carnivore and herbivore, touch, see, smell, hear and taste. • Names of animals experienced first-hand from each vertebrate group (Animal visit)	

Common 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.	
Apply knowledge in familiar related contexts, including a range of enquiries	
Lessons	Summative Assessment
Key Question: What are the parts of your body called? (Identifying and classifying) WALT make close observations of parts of the body e.g. hands, eyes. WALT compare two people. WALT take measurements of parts of their body. WALT classify people according to their features. WALT compare parts of their own body. Key Question: Are you an animal? (Identifying and classifying) WALT make close observations of animals from each of the groups. WALT compare two animals from the same or different groups. WALT classify animals using a range of features. WALT identify animals by matching them to named images. WALT classify animals according to what they eat. Key Question: Do people with big hands have big feet? (Pattern seeking) WALT look for patterns between people Key Question: Is our sense of smell better when we can't see? (Comparative tests) WALT investigate human senses e.g. Which part of my body is good for feeling, which is not? Which food/flavours can I identify by taste? Which smells can I match? Key Question: Do all animals have the same senses as humans? (Research) WALT find out animals use their senses in different ways.	- Can sort and group animals using similarities and differences - Can create a drawing of an imaginary animal labelling its key features - Can name body parts correctly when talking about measurements and comparisons e.g. "My arm is x straws long." "My arm is x straws long and my leg is y straws long. My leg is longer than my arm." "We both have hands, but his are bigger than mine." "These people have brown eyes and these have blue."
Scientific enquiry elements covered during this topic: - Comparative tests - Research - Identifying and classifying - Pattern seeking	

	Year - 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.	1	Topic	Plants
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Prior learning	Building on prior learning (Plants)
Know some similarities and differences between the natural world around them and contrasting environments, drawing on their experiences and what has been read in class (Early Learning Goal) <u>Nursery</u> Use their senses to explore plants, flowers and trees Make simple observations about what they see (colour, size...) Use new vocabulary to name some parts (petal, stem, leaf, trunk, branch, conker, acorn, pine cone) Name some vegetables and fruits <u>Reception</u> Make simple observations about what they see, using newly introduced vocabulary Use newly introduced vocabulary to name some parts (petal, stem, leaf, trunk, branch, conker, acorn, pine cone) of a flower, plant or tree Sequence the life cycle of a plant/ tree Name a few familiar trees in the environment Make an observational drawing of a tree/plant/flower	- 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) - Identify and name a variety of plants and animals in their habitats, including microhabitats. (Y2 - Living things and their habitats) - Identify and describe the functions of different parts of flowering plants: roots, stem/trunk, leaves and flowers. (Y3 - Plants) - Investigate the way in which water is transported within plants. (Y3 Plants)

WHAT PUPILS NEED TO KNOW OR DO TO BE SECURE	
Show understanding of a concept using scientific vocabulary correctly	
Key learning	Formative Assessment
- Growing plants and trees locally. - Naming plants which all have specific names. These can be identified by looking at the key characteristics of the plant. - Plants have common parts, but they vary between the different types of plants. - Some trees keep their leaves all year while other trees drop their leaves during autumn and	- Can name trees and other plants that they see regularly - Can describe some of the key features of these trees and plants e.g. the shape of the leaves, the colour of the flower/blossom

grow them again during spring.	• Can point out trees which lost their leaves and those that kept them the whole year • Can point to and name the parts of a plant, recognising that they are not always the same e.g. leaves and stems may not be green
Scientific vocabulary	
Leaf, flower, blossom, petal, fruit, berry, root, seed, trunk, branch, stem, bark, stalk, bud, deciduous, evergreen Names of trees in the local area (school grounds and local area), e.g. apple tree, cherry tree, willow, oak tree, silver birch Names of garden and wild flowering plants in the local area, e.g. daffodil, hydrangea, poppy.	

Common misconceptions

Some children may think:

- plants are flowering plants grown in pots with colored petals, 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

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

Lessons

Summative Assessment

Key Question: How can we sort our leaves, seeds, flowers that we collected on our walk? (Identifying and Classifying)

WALT classify leaves, seeds, flowers etc. using a range of characteristics. (Make close observations of leaves, seeds, flowers etc. and then classify using a range of characteristics). WALT compare two leaves / seeds / flowers etc.

Key Question: Do all plants in our local area look the same? (NC)

WALT name plants (by matching them to named images). WALT label parts of a plant.

WALT find, name and describe plants outside (identify plants at Eatock Lodge or other outdoor location to find plants that are the same as those studied locally in the wildlife areas/ school grounds, describing the key features that helped them).

Key Question: What type of plant grows the quickest? (Comparative tests)

WALT plants change over a period of time (Set up an experiment and make observations of how plants change over a period of time- Comparative tests).

WALT grow a variety of items.

WALT record our flowers changing each week.

Key Question: Do taller trees have the bigger leaves? (Pattern seeking)

WALT name and identify trees.

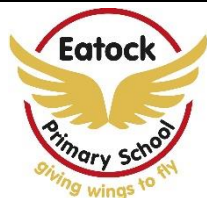
WALT to label parts of a tree.

WALT name and compare deciduous and evergreen trees

Scientific enquiry elements covered during this topic: (Planned within Lessons above)

- Identifying and Classifying
- Comparative tests
- Observation over time
- Pattern seeking

- Can sort and group parts of plants using similarities and differences
- Can use simple charts etc. to identify plants
- Can use photographs to talk about how plants change over time



Year	1	Topic	Seasonal Changes
- Observe changes across the four seasons. - Observe and describe weather associated with the seasons and how day length varies.			

Prior learning	Future learning
- Understand some important processes and changes in the natural world around them, including the seasons and changing states of matter (Early Learning Goal) - Explore the natural world around them, making observations and drawing pictures of animals and plants - Know some similarities and differences between the natural world around them and contrasting environments, drawing on their experiences and what has been read in class <u>Nursery</u> Notice and begin to talk about the weather Experience and talk about simple changes they have observed happening to the weather (rain, windy, frost, snow, warm...) Comment on the changes that happen to plants and trees as the seasons change Notice the signs of Autumn, Winter as they explore outside <u>Reception</u> Develop an understanding of the four seasons and comment on the changes as they occur/ experience them Develop an understanding of animal behaviour in different seasons Experience and talk about simple changes they have observed happening to the weather (rain, windy, frost, snow, warm...) using a wider vocabulary	- Recognise that light from the sun can be dangerous and that there are ways to protect their eyes. (Y3 - Light) - Use the idea of the Earth's rotation to explain day and night and the apparent movement of the Sun across the sky. (Y5 - Earth and space) - The seasons and the Earth's tilt, day length at different times of year, in different hemispheres. (KS3)

WHAT PUPILS NEED TO KNOW OR DO TO BE SECURE

Show understanding of a concept using scientific vocabulary correctly

Key learning

- In the UK, the day length is longest at mid-summer (about 16 hours) and gets shorter each day until mid-winter (about 8 hours) before getting longer again.
- The weather also changes with the seasons. In the UK, it is usually colder and rainier in winter, and hotter and dryer in the summer. The change in weather causes many other changes. Some examples are: numbers of minibeasts found outside; seed and plant growth; leaves on trees; and type of clothes worn by people.

Scientific vocabulary

- Weather (sunny, rainy, windy, snowy etc.)
- Seasons (winter, summer, spring, autumn)
- Sun, sunrise, sunset, day length

Formative Assessment

- Can name the four seasons and identify when in the year they occur
- Can describe weather in different seasons over a year
- Can describe days as being longer (in time) in the summer and shorter in the winter
Can describe other features that change through the year

Common 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.	
Apply knowledge in familiar related contexts, including a range of enquiries	
Lessons	Summative Assessment
Key Question: In what season does it rain the most? (Comparative tests) WALT collect information about the weather regularly throughout the year. WALT present this information in tables and charts to compare the weather across the seasons. Key Question: Is the Wildlife Area the same every season? (Observations over time) WALT collect information, regularly throughout the year, of features that change with the seasons e.g. plants, animals, humans. Key Question: How long is a day? (Observation over time) WALT gather data about the length of days in different seasons.	• Use the evidence gathered to describe the general types of weather and changes in day length over the seasons. • Use their evidence to describe some other features of their surroundings, e.g. themselves, animals, plants that change over the seasons • Demonstrate their knowledge in different ways e.g. making a weather forecast video, writing seasonal poetry, creating seasonal artwork
Scientific enquiry elements covered during this topic: • Observations over time • Comparative tests	

Year 2

Science progression of knowledge and skills grid



	Year - 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 micro-habitats - 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	2	Topic	Living things and their habitat
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Prior learning	Future learning
- 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) - 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) - Observe changes across the four seasons. (Y1 - Seasonal changes) - 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) - 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) - Observe changes across the four seasons. (Y1 - Seasonal changes)	- Recognise that living things can be grouped in a variety of ways. (Y4 - Living things and their habitats) - Explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment. (Y4 - Living things and their habitats) - Recognise that environments can change and that this can sometimes pose dangers to living things. (Y4 - Living things and their habitats) - Construct and interpret a variety of food chains, identifying producers, predators and prey. (Y4 - Animals, including humans)

WHAT PUPILS NEED TO KNOW OR DO TO BE SECURE

Show understanding of a concept using scientific vocabulary correctly

Key learning

- All objects are either living, dead or have never been alive. Living things are plants (including seeds) and animals. Dead things include dead animals and plants and parts of plants and animals that are no longer attached e.g. leaves and twigs, shells, fur, hair and feathers (This is a simplification, but appropriate for Year 2 children.) An object made of wood is classed as dead. Objects made of rock, metal and plastic have never been alive (again ignoring that plastics are made of fossil fuels).
- Animals and plants live in a habitat to which they are suited, which means that animals have suitable features that help them move and find food and plants have suitable features that help them to grow well. The habitat provides the basic needs of the animals and plants – shelter, food and water.
- Within a habitat there are different micro-habitats e.g. in a woodland – in the leaf litter, on the bark of trees, on the leaves. These micro-habitats have different conditions e.g. light or dark, damp or dry. These conditions affect which plants and animals live there. The plants and animals in a habitat depend on each other for food and shelter etc. The way that animals obtain their food from plants and other animals can be shown in a food chain.

Scientific vocabulary

- **Revisit: deciduous, evergreen, carnivore, omnivore, herbivore**
- 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.

Formative Assessment

- Can find a range of items outside that are living, dead and never lived
- Can name a range of animals and plants that live in a habitat and micro-habitats that they have studied
- Can talk about how the features of these animals and plants make them suitable to the habitat
- Can talk about what the animals eat in a habitat and how the plants provide shelter for them
- Can construct a food chain that starts with a plant and has the arrows pointing in the correct direction

Common misconceptions	
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'.	
Apply knowledge in familiar related contexts, including a range of enquiries	
Lessons	Summative Assessment
Key Question: Is a flame alive? Is a deciduous tree dead in winter? (Research) WALT explore the outside environment to find objects that are living, dead and have never lived. Key Question: How would you group things to show which are living, dead or have never been alive? (Identifying and classifying) WALT classify objects found in the local environment. Key Question: Would worms and caterpillars live together? (Identifying and classifying) WALT observe animals and animal habitats and microhabitats. WALT observe animals and plants carefully, drawing and labelling diagrams. Key Question: What do insects eat the most? (Pattern seeking) WALT create simple food chains for a familiar local habitat from first-hand observation and research. WALT create simple food chains from information given. Key Question: How does the habitat of the Arctic compare to the habitat of the rainforest? (Research) WALT compare different habitats.	• Can sort into living, dead and never lived • Can give key features that mean the animal or plant is suited to its micro-habitat. Can explain in simple terms why an animal or plant is suited to a habitat e.g. the caterpillar cannot live under the soil like a worm as it needs fresh leaves to eat; the seaweed we found on the beach cannot live in our pond because it is not salty • Using a food chain can explain what animals eat
Scientific enquiry elements covered during this topic: • Identifying and classifying • Research • Pattern seeking	

	Year	2	Topic	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.			

Prior learning	Future learning
- 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)	- Compare and group together different kinds of rocks on the basis of their appearance and simple physical properties. (Y3 - Rocks) - Notice that some forces need contact between two objects, but magnetic forces can act at a distance. (Y3 - Forces and magnets) - 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) - 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)

WHAT PUPILS NEED TO KNOW OR DO TO BE SECURE	
Show understanding of a concept using scientific vocabulary correctly	
Key learning	Formative Assessment
- All objects are made of one or more materials that are chosen specifically because they have suitable properties for the task. For example, a water bottle is made of plastic because it is transparent and waterproof. The properties are compared with possible materials. - A material can be suitable for different purposes and an object can be made of different materials. - Objects made of some materials can be changed in shape by bending, stretching, squashing and twisting. For example, clay.	- Can name an object, say what material it is made from, identify its properties and make a link between the properties and a particular use. - Whilst changing the shape of an object can describe the action used. - Can use the words flexible and/or stretchy to describe materials that can be changed in shape and stiff and/or rigid for those that cannot. - Can recognise that a material may come in different forms which have different properties.
Scientific vocabulary	
Revisit Year 1: Object, material, wood, plastic, glass, metal, water, rock, brick, paper, fabric, elastic, foil, card/cardboard, rubber, wool, clay, hard, soft, stretchy, stiff, bendy, floppy, waterproof, absorbent, not absorbent, rough, smooth, shiny, dull, see-through, not see-through opaque, transparent and translucent, reflective, non- reflective, flexible, rigid, shape, push/pushing, pull/pulling, twist/twisting, squash/squashing, bend/bending, stretch/stretching	

Common 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.	
Apply knowledge in familiar related contexts, including a range of enquiries	
Lessons	Summative Assessment
Key Question: Would a paper boat float forever? How long do bubble bath bubbles last for? (Observations over time) WALT test the properties of materials for a particular use. Key Question: What materials will let electricity go through them, and which will not? (Identifying and classifying) WALT classify materials. Key Question: What is the best material for a pirate ship? (Comparative tests) WALT make suggestions about alternative materials for a purpose that are both suitable and unsuitable. WALT test the properties of materials for particular uses e.g. compare the stretchiness of fabrics to select the most appropriate for sail, test materials for waterproofness to select the most appropriate for the boat lining. Key Question: How are plastics made? (Research) WALT find out about materials and their properties (Charles Mackintosh)	• Can sort materials using a range of properties • Can explain using the key properties why a material is suitable or not suitable for a purpose • Can begin to choose an appropriate method for testing a material for a particular property and test evidence to select appropriate material for a purpose?
Scientific enquiry elements covered during this topic:	
• Observations over time • Identifying and classifying • Comparative tests • Research	

	Year • 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.	2	Topic	Animals including humans
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Prior learning	Future learning
• Identify and name a variety of common animals that are carnivores, herbivores and omnivores. (Y1 - Animals, including humans) • 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)	• 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) • 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) 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	Formative Assessment
• Animals, including humans, have offspring which grow into adults. In humans and some animals, these offspring will be young, such as babies or kittens, that grow into adults. In other animals, such as chickens or insects, there may be eggs laid that hatch to young or other stages which then grow to adults. The young of some animals do not look like their parents e.g. tadpoles. • All animals, including humans, have the basic needs of feeding, drinking and breathing that must be satisfied in order to survive. To grow into healthy adults, they also need the right amounts and types of food and exercise. • Good hygiene is also important in preventing infections and illnesses.	• Can describe how animals, including humans, have offspring which grow into adults, using the appropriate names for the stages • Can state the basic needs of animals, including humans, for survival • Can state the importance for humans of exercise, eating the right amounts of different types of food, and hygiene • Can name foods in each section of the Eatwell Guide
Scientific vocabulary	
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)	

Common 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.

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

Lessons

Key Question: How does a tadpole change over time? (Observations over time)

WALT ask people questions and use secondary sources to find out about the life cycles. Ask questions of a parent about how they look after their baby. Ask pet owners questions about how they look after their pet. WALT match animals to their offsprings.

WALT observe animals growing over a period of time e.g. chicks, caterpillars, a baby.

Key Question: Do bananas make us run faster? (Comparative tests)

WALT explore the effect of exercise on our bodies.

Key Question: What food do you need in a healthy diet? Why? (Research)

WALT classify food in a range of ways, including using the [Eatwell Guide](#).

Key Question: Do younger or older children wash their hands more? (Pattern seeking)

WALT investigate washing hands, using glitter gel.

Scientific enquiry elements covered during this topic:

- **Observations over time**
- **Comparative tests**
- **Research**
- **Pattern seeking**

Summative Assessment

- Can describe, including using diagrams, the life cycle of some animals, including humans, and their growth to adults e.g. by creating a life cycle book for a younger child
- Show what they know about looking after a baby/animal by creating a parenting/pet owners' guide.
- Explain how to keep healthy.

	Year	2	Topic	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.				

Prior learning	Future learning
- 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 describe the functions of different parts of flowering plants: roots, stem/trunk, leaves and flowers. (Y3 - Plants) - 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. (Y3 - Plants) - Investigate the way in which water is transported within plants. (Y3 – Plants. - Explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal. (Y3 - Plants)

WHAT PUPILS NEED TO KNOW OR DO TO BE SECURE	
Show understanding of a concept using scientific vocabulary correctly	
Key learning	Formative Assessment
- Plants may grow from either seeds or bulbs. These then germinate and grow into seedlings which then continue to grow into mature plants. These mature plants may have flowers which then develop into seeds, berries, fruits etc. - Seeds and bulbs need to be planted outside at particular times of year and they will germinate and grow at different rates. Some plants are better suited to growing in full sun and some grow better in partial or full shade. - Plants also need different amounts of water and space to grow well and stay healthy.	- Can describe how plants that they have grown from seeds and bulbs have developed over time - Can identify plants that grew well in different conditions
Scientific vocabulary	
Revisit Year 1: Leaf, flower, blossom, petal, fruit, berry, root, seed, trunk, branch, stem, bark, stalk, bud, deciduous, evergreen Light, shade, sun, warm, cool, water, grow, healthy	

Common 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.

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

Lessons

Key Question: Are seeds and bulbs the same? (Identifying and classifying)

WALT classify seeds and bulbs.

WALT make close observations of seeds and bulbs.

Key Question: What happens to my bulb after I planted it? (Observations over time)

WALT research and plan when and how to plant a range of seeds and bulbs.

WALT look after the plants as they grow.

WALT make close observations and measurements of plants.

WALT make comparisons between plants as they grow.

Key Question: Do bigger seeds grow into bigger plants? (Pattern seeking)

WALT find out what plants need to grow.

Summative Assessment

- Can spot similarities and difference between bulbs and seeds
- Can nurture seeds and bulbs into mature plants identifying the different requirements of different plants

Scientific enquiry elements covered during this topic:

- Identifying and classifying
- Observations over time
- Pattern seeking

Year 3

Science progression of knowledge and skills grid



	Year • 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.	3	Topic	Forces and magnets
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Prior learning	Future learning
• 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)	• 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	Formative Assessment
• 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. • 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. • 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.	• 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

Scientific 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 (gravity, friction – Greater Depth vocab)

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	
Lessons	Summative Assessment
Key Question: Which materials are magnetic? Identifying and classifying WALT observe materials that are attracted to a magnet. WALT classify materials that are magnetic or not. Key Question: Which magnet is the strongest? Comparative tests WALT investigate and test the strength of magnets. Key Question: How do magnets move? Research WALT explore the way that magnets behave in relation to each other. WALT explore how magnets work at a distance e.g. through the table, in water, jumping paper clips up off the table. Key Question: How does the surface that a toy car moves on affect the distance that it will travel? (Fair Test) WALT investigate how objects move on different surfaces e.g. grass, gravel, wooden flooring, concrete etc. WALT – some forces need contact between two objects (friction)	- 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
Scientific enquiry elements covered during this topic: - Identifying and classifying - Comparative tests - Research - Fair tests	

	Year 	3 	Topic 	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.				

Prior learning	Future learning
• 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)	• 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	Formative Assessment
• 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. • 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. • 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.	• 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
Scientific 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	
Lessons	Summative Assessment
Key Question: How many sources of light are there? Research NC WALT name light sources including the sun WALT the moon, windows and mirrors are not sources of light WALT light from the sun can be dangerous and there are ways to protect our eyes. Key Question: Can you see in the dark? Investigate through task WALT we need light in order to see things. WALT darkness is the absence of all light. Key Question: Which object reflects the most light? WALT observe how objects with different surfaces, e.g. shiny vs matt reflect light. Key Question: How does the number of layers of transparent plastic affect how much light can pass through? Fair tests WALT investigate which material is best for blocking out. Key Question: What happens to shadows when the light source is moved? Pattern seeking WALT shadows are formed when the light from a light source is blocked. WALT explore how shadows vary. (when distance between a light source and an object or surface is changed) WALT Observe shadows which are connected to and disconnected from the object e.g. shadows of clouds and children in the playground.	• 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
Scientific enquiry elements covered during this topic: • Fair tests • Pattern seeking • Research	

	Year	3	Topic	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.			

Prior learning	Future learning
- 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)	- 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	Formative Assessment
- 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. - 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.	- 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
Scientific 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: - 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	
Lessons	Summative Assessment
Key Question: Is a rock always hard? Identifying and classifying Observations over time WALT observe and classify rocks in a range of ways. (Appearance, hardness, if they are crumbly, rock types etc) WALT compare rocks based on their properties (density/hard/soft/permeability) Key Question: Which soil is the most permeable? Fair tests WALT – soil are made of rocks and organic matter WALT observe and classify soils (loam, sandy soil, clay) WALT observe how much water filters through different types of soil (loam, sandy soil, clay) Key Question: Who is Mary Anning? Research WALT observe fossils. WALT explain how fossils are formed WALT research the work of Mary Anning.	- Can classify rocks in a range of different ways, using appropriate vocabulary - 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
Scientific enquiry elements covered during this topic: - Research - Fair tests - Identifying and classifying - Observations over time	

	Year	3	Topic	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. - Identify that humans and some other animals have skeletons and muscles for support, protection and movement.			

Prior learning	Future learning
- 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)	- 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	Formative Assessment
- Animals, unlike plants which can make their own food, need to eat in order to get the nutrients they need. 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. - Humans, and some other animals, have skeletons and muscles which help them move and provide protection and support.	- 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 - 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
Scientific vocabulary	
Nutrition, nutrients, carbohydrates, sugars, protein, vitamins, minerals, fibre, fat, water, skeleton, bones, muscles, support, protect, move, skull, ribs, spine, muscles, joints 3 types of skeleton: hydrostatic, exoskeleton and endoskeleton.	

Common 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.

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

Lessons

Key Question: What do you need to eat to stay healthy? Research NC

WALT classify food in a range of ways. (answering enquiry questions such as how much sugar in in this soft drink?)

WALT label and identify the food groups and their importance.

WALT use secondary sources to find out the types of food that contain the different nutrients.

WALT design a healthy balanced meal for my friend.

Key Question: How do the skeletons of different animals compare? Identifying and classifying

WALT research the parts and functions of the skeleton using secondary sources.

WALT identify and sort animals with different skeleton types (3 types of skeleton: hydrostatic, exoskeleton and endoskeleton)

WALT different parts of the body have special functions (muscles).

WALT bones protect vital organs such as the lungs, heart and brain.

Key Questions: Can people with longer legs run faster? Can people with bigger hands catch a ball better? Pattern seeking

Scientific enquiry elements covered during this topic:

- Pattern seeking
- Identifying and classifying
- Research

Summative Assessment

- 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 give similarities e.g. they all have joints to help the animal move, and differences between skeletons

	Year	3	Topic	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.			

Prior learning	Future learning
- 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)	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	Formative Assessment
- 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. A flowering plant needs pollination, seed formation and seed dispersal during its life cycle. - Pollination forms seeds, sometimes contained in berries or fruits which are then dispersed in different ways. Different plants require different conditions for germination and growth.	- 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
Scientific vocabulary	
Photosynthesis, pollen, insect/wind pollination, seed formation, seed dispersal (wind dispersal, animal dispersal, water dispersal)	

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

Lessons

Key Question: Which conditions help seeds germinate faster? Comparative tests

WALT name the parts of a plant (roots, stem/trunk, leaves, flowers, ovary, stigma)

WALT 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

Key Question: Are you a seed detective? Research and Observations over time

WALT observe seeds being blown from the trees e.g. sycamore seeds.

WALT classify seeds in a range of ways **Identifying and classifying**

WALT research different types of seed dispersal.

Key Question: How does the length of the stem affect how fast the food colouring dyes the petals? Fair tests

WALT explain how water is transported in plants.

WALT observe the effect of putting cut white petals in coloured water.

Key Question: What is pollination? Research

WALT observe flowers carefully to identify the pollen.

WALT explain how pollination works.

WALT observe flowers being visited by pollinators e.g. bees and butterflies in the summer.

Summative Assessment

- Can explain observations made during investigations
- 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

Scientific enquiry elements covered during this topic:

- **Comparative tests**
- **Research**
- **Observations over time**
- **Fair tests**

Year 4

Science progression of knowledge and skills grid



	Year	4	Topic	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.			

Prior learning	Future learning
• 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)	• 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	Formative Assessment
• Living things can be grouped (classified) in different ways according to their features. Classification keys can be used to identify and name living things. • 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.	• 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 • Can present their learning about changes to the environment in different ways e.g. campaign video, letter
Scientific 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

Lessons

Key Question: Can we use identification keys to identify all the animals we found in the Wildlife Area?

Identifying and Classifying

WALT compare and contrast the living things observed by their characteristics.

WALT use classification keys to name unknown living things.

WALT classify living things found in different habitats based on their features.

WALT create a simple identification key based on observable features.

Key Question: Do some animals (including mini-beasts) prefer to live in an environment with light and some prefer a dark environment? Do some animals prefer a dry environment and do some prefer a damp environment? Fair tests

WALT plan an investigation with a fair test (answer one of the key questions).

WALT investigate and make observations to answer our key scientific question.

WALT research other animals to further answer our key scientific question.

OR

Key Question: Does the amount of light affect how many woodlice move around? Fair tests

WALT observe plants and animals in different habitats throughout the year in our local environment. WALT observe animal habitats in our local environment.

WALT carry out a fair test to see the effect of light on woodlice.

Key Question: Why are people cutting down the rainforest and what effect does that have? Research

WALT use secondary sources to find out about how environments may naturally change.

WALT use secondary sources to find out about human impact, both positive and negative, on environments.

WALT use fieldwork to explore human impact on the local environment e.g. litter, tree planting.

Summative Assessment

- 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

Scientific enquiry elements covered during this topic:

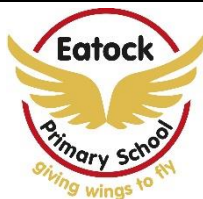
- Research
- Fair test
- Identifying and classifying

	Year	4	Topic	Animals including 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.				

Prior learning	Future learning
- 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)	- 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	Formative Assessment
- 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. 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. - Humans have four types of teeth: incisors for cutting; canines for tearing; and molars and premolars for grinding (chewing). - Living things can be classified as producers, predators and prey according to their place in the food chain.	- Can sequence and draw the main parts of the digestive system - 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 and construct a food chain. - 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
Scientific 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	
Lessons	Summative Assessment
Key Question: What are organs are involved in the digestive system? Identifying and classifying WALT identify the function of the parts of the digestive system. WALT create a model of the digestive system (either using household objects or using computer program). WALT understand and sequence the digestive system by drawing a diagram or verbal explanation. Key Question: How does an egg shell change when it is left in a variety of liquids? Observing over time WALT identify what damages teeth. WALT identify ways to protect our teeth. Key Question: Do all mammals have the same type of teeth? WALT explore eating different types of food to identify which teeth are being used for cutting, tearing and grinding (chewing). WALT the importance of having different teeth. WALT explain the role of teeth. WALT classify animals as herbivores, carnivores or omnivores according to the type of teeth they have in their skulls. Key Question: Who eats who? Research WALT use a food chain to identify producers, predators and prey within a habitat. WALT create a food chain based on an animal from our local environment. WALT create a food web and can explain what it shows. WALT use secondary sources to identify animals in a habitat and find out what they eat.	- 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 create food chains based on research
Scientific enquiry elements covered during this topic:	
- Identifying and classifying - Observing over time - Research	



Year	4	Topic	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.			

Prior learning	Future learning
- 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)	- 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)

WHAT PUPILS NEED TO KNOW OR DO TO BE SECURE

Show understanding of a concept using scientific vocabulary correctly

Key learning	Formative Assessment
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	- Can create a concept map, including arrows linking the key vocabulary - Can name properties of solids, liquids and gases

of a solid. • 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. • 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.	• Can give everyday examples of melting and freezing • Can give everyday examples of evaporation and condensation • Can describe the water cycle • From their data, can explain how to speed up or slow down evaporation • Can explain why there is condensation on the inside the hot water cup but on the outside of the icy water cup
Scientific vocabulary	
Solid, liquid, gas, state change, melting, freezing, melting point, boiling point, evaporation, temperature, water cycle Solid, liquid, gas, state change, melting, freezing, melting point, boiling point, evaporation, temperature, water cycle Solid, liquid, gas, state change, melting, freezing, melting point, boiling point, evaporation, temperature, water cycle	

Common 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.

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

Lessons

Key Question: What is a solid, liquid or gas? Identifying and classifying

WALT observe closely and classify a range of solids and liquids.

WALT classify materials according to whether they are solids, liquids and gases.

WALT 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.

Key Question: Is there a pattern in how long it takes different sized iced lollies to melt? Pattern seeking

WALT observe a range of materials melting e.g. ice, chocolate, butter. **Observations over time**

WALT investigate the melting point of different materials e.g. margarine, butter and chocolate.

WALT investigate how to melt ice quickly.

WALT explore and observe freezing different liquids e.g. tomato ketchup, oil, shampoo.

WALT use a thermometer to measure temperatures e.g. icy water (melting), tap water, hot water, boiling water (demonstration).

Key Question: Does pond water evaporate quicker than fresh water? Comparative tests

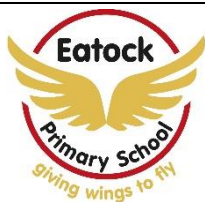
WALT observe water evaporating and condensing e.g. on cups of icy water and hot water.

WALT investigate changing the rate of evaporation e.g. washing, puddles, handprints on paper towels, liquids in containers. **Fair test**

Summative Assessment

- 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

WALT understand the water cycle.	
Scientific enquiry elements covered during this topic:	
• Identifying and classifying • Pattern seeking • Observations over time • Comparative test • Fair tests	



Year	4	Topic	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.			

Prior learning	Future learning
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)	- 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	Formative Assessment
- 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. - 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. - Pitch is the highness or lowness of a sound and is affected by features of objects producing	- 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

the sounds. For example, smaller objects usually produce higher pitched sounds.	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 • Can use data to identify patterns in pitch and volume
Scientific vocabulary	
Sound, source, vibrate, vibration, travel, pitch (high, low), volume, faint, loud, insulation	

Common 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 loud and low sounds are quiet.	
Apply knowledge in familiar related contexts, including a range of enquiries	
Lessons	Summative Assessment
Key Question: How do we hear things? Research WALT classify sound sources. WALT make and explore how string telephones or ear gongs work. WALT explore making sounds with a range of objects, such as musical instruments and other household objects. WALT 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. Key Question: Are two ears better than one? Comparative tests WALT investigate making sounds and how it travels. WALT investigate what materials are best to stop sound travelling. Key Question: How does the volume of a drum change as you move further away from it? Fair Tests WALT measure sounds over different distances. WALT measure sounds through different insulation materials. Key Question: Who is Alexander Graham Bell? (Research) WALT Alexander Graham Bell and his impact on Science.	• 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 explain how loudness can be reduced by moving further from the sound source or by using a sound insulating medium
Scientific enquiry elements covered during this topic:	
• Research • Comparative tests • Fair tests	

	Year	4	Topic	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.				

Prior learning	Future learning
Children know about similarities and differences in relation to places, objects, materials and living things. They talk about the features of their own immediate environment and how environments might vary from one another. They make observations of animals and plants and explain why some things occur and talk about changes. (Early Learning Goal)	- 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	Formative Assessment
- 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. - 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.	- 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 - 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
Scientific 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

Lessons

Key Question: Is it an insulator or conductor? Identifying and classifying

WALT identify and classify materials that are insulators or conductors. WALT classify the materials that were suitable/not suitable for wires.

WALT identify which appliances need electricity to work (common appliances).

Key Question: How does a light bulb work? Research

WALT identify electrical components and their symbols (cells, wires, bulbs, switches and buzzers).

WALT create a simple electrical circuit (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 link this to a DT project).

Key Question: How does the thickness of a conducting material affect how bright the lamp is?

Fair Tests

WALT explain how an electrical switch works. (switch open or closed)

WALT predict whether a circuit will work and how it can be fixed.

N.B.

Children should be given one component at a time to add to circuits.

Summative Assessment

- 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

Scientific enquiry elements covered during this topic:

- Identifying and classifying
- Research
- Fair tests

Year 5

Science progression of knowledge and skills grid



	Year	5	Topic	Animals including humans
	Describe the changes as humans develop to old age.			

Prior learning	Future learning
Notice that animals, including humans, have offspring which grow into adults. (Y2 - Animals, including humans)	Reproduction in humans (as an example of a mammal), including the structure and function of the male and female reproductive systems, menstrual cycle (without details of hormones), gametes, fertilisation, gestation and birth, to include the effect of maternal lifestyle on the foetus through the placenta. (KS3)

WHAT PUPILS NEED TO KNOW OR DO TO BE SECURE	
Show understanding of a concept using scientific vocabulary correctly	
Key learning	Formative Assessment
When babies are young, they grow rapidly. They are very dependent on their parents. As they develop, they learn many skills. At puberty, a child's body changes and develops primary and secondary sexual characteristics. This enables the adult to reproduce. This needs to be taught alongside PSHE. The new statutory requirements for relationships and health education can be found below: statutory guidance on Physical health and mental wellbeing (primary and secondary). Other useful guidance includes: Joint briefing on teaching about puberty in KS2 from PHSE Association and Association for Science Education Briefing on humans development and reproduction in the Primary Curriculum from PHSE Association and Association for Science Education.	- Can explain the changes that takes place in boys and girls during puberty - Can explain how a baby changes physically as it grows, and also what it is able to do
Scientific vocabulary	
Puberty – the vocabulary to describe sexual characteristics	

Common misconceptions

Some children may think:

- a baby grows in a mother's tummy
- a baby is "made".

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

Lessons

Key Question: How is a baby made? Research

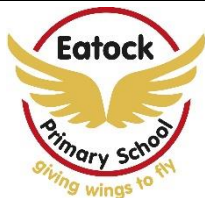
This unit is likely to be taught through direct instruction due to its sensitive nature, although children can carry out a research enquiry by asking an expert e.g. school nurse to provide answers to questions that have been filtered by the teacher.

Summative Assessment

Can present information about the changes occurring during puberty as an information leaflet for other Y5 children or answers to 'problem page questions'

Scientific enquiry elements covered during this topic:

- **Research**



Year	5	Topic	Properties and changes of materials
	• Compare and group together everyday materials on the basis of their properties, including their hardness, solubility, transparency, conductivity (electrical and thermal), and response to magnets. • Know that some materials will dissolve in liquid to form a solution and describe how to recover a substance from a solution. • Use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating. • Give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic. • Demonstrate that dissolving, mixing and changes of state are reversible changes. • Explain that some changes result in the formation of new materials, and that this kind of change is not usually reversible, including changes associated with burning and the action of acid on bicarbonate of soda.		

Prior learning	Future learning
• 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) • Compare and group materials together, according to whether they are solids, liquids or gases. (Y4 - States of matter) • 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). (Y4 - States of matter) • Identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature. (Y4 - States of matter)	• Chemical reactions as the rearrangement of atoms. (KS3) • Representing chemical reactions using formulae and using equations. (KS3) • Combustion, thermal decomposition, oxidation and displacement reactions. (KS3) • Defining acids and alkalis in terms of neutralisation reactions. (KS3) The pH scale for measuring acidity/alkalinity; and indicators. (KS3)

WHAT PUPILS NEED TO KNOW OR DO TO BE SECURE

Show understanding of a concept using scientific vocabulary correctly

Key learning	Formative Assessment
- Materials have different uses depending on their properties and state (liquid, solid, gas). Properties include hardness, transparency, electrical and thermal conductivity and attraction to magnets. Some materials will dissolve in a liquid and form a solution while others are insoluble and form sediment. - Mixtures can be separated by filtering, sieving and evaporation. - 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.	- Can use understanding of properties to explain everyday uses of materials, for example, how bricks, wood, glass and metals are used in buildings - Can explain what dissolving means, giving examples - Can name equipment used for filtering and sieving - Can use knowledge of liquids, gases and solids to suggest how materials can be recovered from solutions or mixtures by evaporation, filtering or sieving - Can describe some simple reversible and non-reversible changes to materials, giving examples
Scientific vocabulary Thermal/electrical insulator/conductor, change of state, mixture, dissolve, solution, soluble, insoluble, filter, sieve, reversible/non-reversible change, burning, rusting, new material	

Common misconceptions	
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. 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.	
Apply knowledge in familiar related contexts, including a range of enquiries	
Lessons	Summative Assessment
Key Question: Can you group these materials? Identifying and classifying WALT classify materials from our classroom. WALT 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. Key Question: Which material is most suitable for a soundproof room? Comparative tests WALT investigate the properties of different materials for particular functions. WALT explain why materials are used for different purposes. Key Question: How does the temperature of tea affect how long it takes for the sugar cube to dissolve? Fair tests WALT investigate rates of dissolving. Key Question: How does a container of salt water change over time? Observations over time WALT observe and record changes to materials. WALT explain how to recover a substance from a solution. WALT identify if a change is easily reversible and how to reverse it. WALT explain that some changes result in the formation of new materials e.g. burning and the action of acid on bicarbonate of soda WALT separate mixtures by sieving, filtering and evaporation. Key Question: What affects the rate of rusting? Comparative tests WALT explore a range of non-reversible changes e.g. rusting, adding fizzy tablets to water and burning. Scientific enquiry elements covered during this topic:	• Can create a chart or table grouping/comparing everyday materials by different properties • Can use test evidence gathered about different properties to suggest an appropriate material for a particular purpose • Can group solids based on their observations when mixing them with water • Can give reasons for choice of equipment and methods to separate a given solution or mixture such as salt or sand in water • Can explain the results from their investigations

• Identifying and classifying • Pattern seeking • Fair tests • Observations over time • Comparatives tests • Research	
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	Year - 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.	5	Topic	Forces
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Prior learning	Future learning
- Compare how things move on different surfaces. (Y3 - Forces and magnets) - Notice that some forces need contact between two objects, but magnetic forces can act at a distance. (Y3 - Forces and magnets) - Observe how magnets attract or repel each other and attract some materials and not others. (Y3 - Forces and magnets) - 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. (Y3 - Forces and magnets) - Describe magnets as having two poles. (Y3 - Forces and magnets) - Predict whether two magnets will attract or repel each other, depending on which poles are facing. (Y3 - Forces and magnets)	- Forces as pushes or pulls, arising from the interaction between two objects. (KS3) - Using force arrows in diagrams, adding forces in one dimension, balanced and unbalanced forces. (KS3) - Moment as the turning effect of a force. (KS3) - Forces: associated with deforming objects; stretching and squashing – springs; with rubbing and friction between surfaces, with pushing things out of the way; resistance to motion of air and water. (KS3) - Forces measured in Newtons, measurements of stretch or compression as force is changed. (KS3)

WHAT PUPILS NEED TO KNOW OR DO TO BE SECURE	
Show understanding of a concept using scientific vocabulary correctly	
Key learning	Formative Assessment
- A force causes an object to start moving, stop moving, speed up, slow down or change direction. Gravity is a force that acts at a distance. Everything is pulled to the Earth by gravity. This causes unsupported objects to fall. - Air resistance, water resistance and friction are contact forces that act between moving surfaces. The object may be moving through the air or water, or the air and water may be moving over a stationary object. - A mechanism is a device that allows a small force to be increased to a larger force. The pay back is that it requires a greater movement. The small force moves a long - distance and the resulting large force moves a small distance, e.g. a crowbar or bottle top remover. Pulleys, levers and gears are all mechanisms, also known as simple machines.	- Can demonstrate the effect of gravity acting on an unsupported object - Can give examples of friction, water resistance and air resistance - Can give examples of when it is beneficial to have high or low friction, water resistance and air resistance - Can demonstrate how pulleys, levers and gears work
Scientific vocabulary	
Force, gravity, Earth, air resistance, water resistance, friction, mechanisms, simple machines, levers, pulleys, gears	

Common 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.

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

Lessons

Summative Assessment

Key Question: How can we become designers? Research

WALT explore how levers, pulleys and gears work (smaller force to have a greater effect)

WALT make a product that involves a lever, pulley or gear.

Key Question: How does the surface area of an object affect the length it will travel? Fair tests

WALT name the forces acting on this object. **Identifying and classifying**

WALT explain friction is a force that slows moving objects down.

WALT investigate the effect of friction in a range of contexts.

Key Question: Who is Isaac Newton (Research)

WALT research Isaac Newton.

Key Question: Do all objects fall through water the same way? Pattern seeking

WALT investigate the effects of water resistance in a range of contexts e.g. dropping shapes through water and pulling shapes, such as boats, along the surface of water.

Key Question: Which shape parachute takes the longest the fall? What shape spinner spins the longest? Comparatives tests

WALT investigate the effects of air resistance in a range of contexts.

- Can explain the results of their investigations in terms of the force, showing a good understanding that as the object tries to move through the water or air or across the surface the particles in the water, air or on the surface slow it down
- Can demonstrate clearly the effects of using levers, pulleys and gears

Scientific enquiry elements covered during this topic:

- **Research**
- **Fair tests**
- **Identifying and Classifying**
- **Pattern seeking**
- **Comparative tests**

	Year	5	Topic	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.				

Prior learning	Future learning
- Observe changes across the four seasons. (Y1 - Seasonal changes) - Observe and describe weather associated with the seasons and how day length varies. (Y1 - Seasonal changes)	- Gravity force, weight = mass x gravitational field strength (g), on Earth $g=10 \text{ N/kg}$, different on other planets and stars; gravity forces between Earth and Moon, and between Earth and Sun (qualitative only). (KS3) - Our Sun as a star, other stars in our galaxy, other galaxies. (KS3) - The seasons and the Earth's tilt, day length at different times of year, in different hemispheres. (KS3) - The light year as a unit of astronomical distance. (KS3)

WHAT PUPILS NEED TO KNOW OR DO TO BE SECURE	
Show understanding of a concept using scientific vocabulary correctly	
Key learning	Formative Assessment
- The Sun is a star. It is at the center of our solar system. There are 8 planets (can choose to name them, but not essential). These travel around the Sun in fixed orbits. Earth takes $365\frac{1}{4}$ days to complete its orbit around the Sun. - The Earth rotates (spins) on its axis every 24 hours. As Earth rotates half faces the Sun (day) and half is facing away from the Sun (night). As the Earth rotates, the Sun appears to move across the sky. The Moon orbits the Earth. It takes about 28 days to complete its orbit. - The Sun, Earth and Moon are approximately spherical.	- Can show, using diagrams or videos, the movement of the Earth and Moon - Can explain the movement of the Earth and Moon - Can show using diagrams the rotation of the Earth and how this causes day and night - Can explain what causes day and night - Can explain evidence gathered about the position of shadows in term of the movement of the Earth and show this using a model - Can explain how a sundial works
Scientific vocabulary	
Earth, Sun, Moon, (Mercury, Jupiter, Saturn, Venus, Mars, Uranus, Neptune), spherical, solar system, rotates, star, orbit, planets	

Common 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.	
Apply knowledge in familiar related contexts, including a range of enquiries	
Lessons	Summative Assessment
Key Question: How could you organise the objects in the solar system? Identifying and classifying WALT name the planets. WALT classify and groups the planets in different ways (terrestrial, gas giant and ice giant). WALT compare the sizes of the planets. Key Question: Is there a pattern between the size of a planet and the time it takes to travel around the sun? Pattern Seeking WALT explain how the Earth and the other planets in the solar system move (make own solar system) WALT use secondary sources to help create a model to show the movement of the Earth around the Sun and the Moon around the Earth (e.g. role play or using balls) WALT use secondary sources to help make a model to show why day and night occur. Key Question: How does the moon move? Research WALT explain how the moon moves. WALT explain how the Moon's appearance appears to change when viewed from Earth (moon phases) WALT explain how day and night were formed (rotations time zones). WALT make a sundial.	- Can use the model to explain how the Earth moves in relation to the Sun and the Moon moves in relation to the Earth - Can demonstrate and explain verbally how day and night occur - Can explain verbally, using a model, why we have time zones
Scientific enquiry elements covered during this topic:	
- Identifying and classifying - Pattern Seeking - Research	

	Year	5	Topic	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.			

Prior learning	Future learning
- Notice that animals, including humans, have offspring which grow into adults. (Y2 - Animals, including humans) - Explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal. (Y3 - Plants)	- Reproduction in humans (as an example of a mammal), including the structure and function of the male and female reproductive systems, menstrual cycle (without details of hormones), gametes, fertilisation, gestation and birth, to include the effect of maternal lifestyle on the foetus through the placenta. (KS3) - 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	Formative Assessment
- As part of their life cycle, plants and animals reproduce. Most animals reproduce sexually. This involves two parents where the sperm from the male fertilises the female egg. Animals, including humans, have offspring which grow into adults. In humans and some animals, these offspring will be born live, such as babies or kittens, and then grow into adults. In other animals, such as chickens or snakes, there may be eggs laid that hatch to young which then grow to adults. Some young undergo a further change before becoming adults e.g. caterpillars to butterflies. This is called a metamorphosis. - Plants reproduce both sexually and asexually. Bulbs, tubers, runners and plantlets are examples of asexual plant reproduction which involves only one parent. Gardeners may force plants to reproduce asexually by taking cuttings. Sexual reproduction occurs through pollination, usually involving wind or insects.	- Can draw the life cycle of a range of animals identifying similarities and differences between the life cycles - Can explain the difference between sexual and asexual reproduction and give examples of how plants reproduce in both ways
Scientific vocabulary	
Life cycle, reproduce, sexual, sperm, fertilises, egg, live young, metamorphosis, asexual, plantlets, runners, bulbs, cuttings petal, anther, sepal, carpel, stigma, style, ovary, pollen grain, pollen tube and ovule	

Common 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.	
Apply knowledge in familiar related contexts, including a range of enquiries	
Lessons	Summative Assessment
Key Question: What are the differences between the life cycle of a mammal and an insect? Research WALT identify the differences in the life cycles of a mammal, an amphibian, an insect and a bird. WALT compare two or more animal life cycles. Key Question: Is there a relationship between a mammal's size and how it changes when it gets older? Pattern Seeking WALT look for patterns between the size of an animal and its expected life span. Key Question: What are the functions of the different parts of the flower? Observations over time WALT name parts of the flower. WALT take cuttings from a range of plants in our local environment. WALT investigate whether a new plant will grow from cuttings. Key Question: At what distance can different flowers be seen? Comparative tests (Introduction to Pollination) WALT describe how flowering plants reproduce. WALT use secondary sources and a range of ways to find out about pollination. WALT understand and compare asexual and sexual reproduction in plants. WALT grow and observe plants that reproduce asexually e.g. strawberries, spider plants, potatoes. Key Question: How does an animal reproduce? Research WALT explain how animals reproduce sexually.	• Can present their understanding of the life cycle of a range of animals in different ways e.g. drama, pictorially, chronological reports, creating a game • Can identify patterns in life cycles • Can compare two or more animal life cycles they have studied • Can explain how a range of plants reproduce asexually
Scientific enquiry elements covered during this topic:	
• Research • Pattern seeking • Observations over time • Comparative tests	

Year 6

Science progression of knowledge and skills grid



	Year - 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.	6	Topic	Living things and their habitats
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Prior learning	Future learning
- Recognise that living things can be grouped in a variety of ways. (Y4 - Living things and their habitats) - Explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment. (Y4 - Living things and their habitats) - 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) - Living things and their habitats)	Differences between species. (KS3)

WHAT PUPILS NEED TO KNOW OR DO TO BE SECURE	
Show understanding of a concept using scientific vocabulary correctly	
Key learning	Formative Assessment
- Living things can be formally grouped according to characteristics. Plants and animals are two main groups but there are other living things that do not fit into these groups e.g. micro-organisms such as bacteria and yeast, and toadstools and mushrooms. Plants can make their own food whereas animals cannot. - Animals can be divided into two main groups: those that have backbones (vertebrates); and those that do not (invertebrates). Vertebrates can be divided into five small groups: fish; amphibians; reptiles; birds; and mammals. Each group has common characteristics. Invertebrates can be divided into a number of groups, including insects, spiders, snails and worms. - Plants can be divided broadly into two main groups: flowering plants; and non-flowering plants.	- Can give examples of animals in the vertebrate groups and some of the invertebrate groups - Can give the key characteristics of the five vertebrate groups and some invertebrate groups - Can compare the characteristics of animals in different groups - Can give examples of flowering and non-flowering plants
Scientific vocabulary	
Vertebrates, fish, amphibians, reptiles, birds, mammals, invertebrates, insects, spiders, snails, worms, flowering, non-flowering	

Common misconceptions	
Some children may think: - all micro-organisms are harmful - mushrooms are plants.	
Apply knowledge in familiar related contexts, including a range of enquiries	
Lessons	Summative Assessment
Key Question: Do all living things breathe? Identifying and classifying WALT classify animals in a variety of ways e.g. use Venn diagrams and Carroll diagrams. WALT classify plants into flowering and non-flowering plants e.g. Venn diagrams and Carroll diagrams. WALT use the local environment to observe and identify characteristics shared by the animals in a group e.g. mini-beasts. WALT use a classification key to explain how organisms are related to each other. WALT use secondary sources to research animals. Key Question: How does the temperature affect how much gas is produced by yeast? Fair test WALT identify microorganisms. WALT observe micro-organisms.	- Can use classification materials to identify unknown plants and animals - Can give a number of characteristics that explain why an animal belongs to a particular group
Scientific enquiry elements covered during this topic:	
- Identifying and classifying - Fair test	

	Year	6	Topic	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.			

Prior learning	Future learning
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- 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. (Y2 - Living things and their habitats) - Describe in simple terms how fossils are formed when things that have lived are trapped within rock. (Y3 - Rocks) - Recognise that environments can change and that this can sometimes pose dangers to living things. (Y4 - Living things and their habitats)	- Heredity as the process by which genetic information is transmitted from one generation to the next. (KS3) - A simple model of chromosomes, genes and DNA in heredity, including the part played by Watson, Crick, Wilkins and Franklin in the development of the DNA model. (KS3) - The variation between species and between individuals of the same species means some organisms compete more successfully, which can drive natural selection. (KS3) - Changes in the environment may leave individuals within a species, and some entire species, less well adapted to compete successfully and reproduce, which in turn may lead to extinction. (KS3)
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WHAT PUPILS NEED TO KNOW OR DO TO BE SECURE

Show understanding of a concept using scientific vocabulary correctly

Key learning	Formative Assessment
- All living things have offspring of the same kind, as features in the offspring are inherited from the parents. Due to reproduction, the offspring are not identical to their parents and vary from each other. - Plants and animals have characteristics that make them suited (adapted) to their environment. If the environment changes rapidly, some variations of a species may not suit the new environment and will die. 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. Over time, these inherited characteristics become more dominant within the population. Over a very long period of time, these characteristics may be so different to how they were originally that a new species is created. This is evolution. - Fossils give us evidence of what lived on the Earth millions of year ago and provide evidence to support the theory of evolution. More recently, scientists such as Darwin and Wallace observed how living things adapt to different environments to become distinct varieties with their own characteristics.	- Can explain the process of evolution - Can give examples of how plants and animals are suited to an environment - Can give examples of how an animal or plant has evolved over time e.g. penguin, peppered moth - Give examples of living things that lived millions of years ago and the fossil evidence we have to support this - Can give examples of fossil evidence that can be used to support the theory of evolution
Scientific vocabulary	
Offspring, sexual reproduction, vary, characteristics, suited, adapted, environment, inherited, species, fossils	

Common 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.	
Apply knowledge in familiar related contexts, including a range of enquiries	
Lessons	Summative Assessment
Key Question: Which beak is best for each food type? Comparative tests WALT observe and classify bird beaks. WALT test which beak type will pick up the most food. WALT to explain adaptation through role play (Bird Beak Stem experiment). WALT to explain adaptation is over a period of time. Key Question: Could a polar bear and an elephant live together? Identifying and classifying WALT identify similarities and differences between animals. WALT to explain how animals are adapted to their environment. WALT explain the process of evolution by natural selection. WALT explain how some plants are adapted to their environment (Venus fly trap, dandelion and cactus) WALT design a new plant or animal to live in a particular habitat. Key Question: What is DNA? Research WALT explain some characteristics are inherited WALT identify features in animals and plants that are passed on to offspring. (artificial breeding of animals or plants e.g. dogs.) Key Question: What do fossils tell us? Research and Observations over time WALT explain who Mary Anning was and why she was important? (Interview/ factfile text) WALT observe fossils to identify living things that lived on Earth millions of years ago. WALT make our own fossils.	- Can identify characteristics that will make a plant or animal suited or not suited to a particular habitat - Can link the patterns seen in the model to real examples - Can explain why the dominant colour of the peppered moth changed over a very short period of time
Scientific enquiry elements covered during this topic: - Comparative tests - Identifying and classifying - Research - Observations over time	

	Year - 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.	6	Topic	Animals including humans
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Prior learning	Future learning
- 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) - 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)	- The consequences of imbalances in the diet, including obesity, starvation and deficiency diseases. (KS3) - The effects of recreational drugs (including substance misuse) on behaviour, health and life processes. (KS3) - The structure and functions of the gas exchange system in humans, including adaptations to function. (KS3) - The mechanism of breathing to move air in and out of the lungs. (KS3) - The impact of exercise, asthma and smoking on the human gas exchange system. (KS3)

WHAT PUPILS NEED TO KNOW OR DO TO BE SECURE	
Show understanding of a concept using scientific vocabulary correctly	
Key learning	Formative Assessment
- The heart pumps blood in the blood vessels around to the lungs. Oxygen goes into the blood and carbon dioxide is removed. The blood goes back to the heart and is then pumped around the body. Nutrients, water and oxygen are transported in the blood to the muscles and other parts of the body where they are needed. As they are used, they produce carbon dioxide and other waste products. 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. This is the human circulatory system. - Diet, exercise, drugs and lifestyle have an impact on the way our bodies function. They can affect how well our heart and lungs work, how likely we are to suffer from conditions such as diabetes, how clearly we think, and generally how fit and well we feel. Some conditions are caused by deficiencies in our diet e.g. lack of vitamins.	- Can draw a diagram of the circulatory system and label the parts and annotate it to show what the parts do - Produces a piece of writing that demonstrates the key knowledge e.g. explanation text, job description of the heart
Scientific vocabulary	
Heart, pulse, rate, pumps, blood, blood vessels, transported, lungs, oxygen, carbon dioxide, nutrients, water, muscles, cycle, circulatory system, diet, exercise, drugs, lifestyle	

Common 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.	
Apply knowledge in familiar related contexts, including a range of enquiries	
Lessons	Summative Assessment
Key Question: What is the circulatory system? Research WALT name and identify the red blood cells, white blood cells and platelets. (Bottle experiment) WALT describe the functions of blood and blood vessels. WALT explain how the blood travels through the body. Key Question: How does the type of activity affect our heart rate? Fair test WALT understand how exercise affects our pulse rate. Key Question: Which drink is the most harmful? Comparative test WALT maintain a balanced diet. WALT explain the effects of drugs on our bodies (smoking alcohol). Key Question: What are nutrients? Identifying and Classifying WALT understand the nutrients and how they are transported.	• Use the role play model to explain the main parts of the circulatory system and their role • Can use subject knowledge about the heart whilst writing conclusions for investigations • Can explain both the positive and negative effects of diet, exercise, drugs and lifestyle on the body Present information e.g. in a health leaflet describing impact of drugs and lifestyle on the body
Scientific enquiry elements covered during this topic: • Research • Fair test • Comparative test • Identifying and classifying	

	Year	6	Topic	Light
	• Recognise that light appears to travel in straight lines. • Use the idea that light travels in straight lines to explain that objects are seen because they give out or reflect light into the eye. • Explain that we see things because light travels from light sources to our eyes or from light sources to objects and then to our eyes. • Use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them.			

Prior learning	Future learning
• Recognise that they need light in order to see things and that dark is the absence of light. (Y3 - Light) • Notice that light is reflected from surfaces. (Y3 - Light) • Recognise that light from the sun can be dangerous and that there are ways to protect their eyes. (Y3 - Light) • Recognise that shadows are formed when the light from a light source is blocked by an opaque object. (Y3 - Light) • Find patterns in the way that the size of shadows change. (Y3 - Light)	• The similarities and differences between light waves and waves in matter. (KS3) • Light waves travelling through a vacuum; speed of light. (KS3) • The transmission of light through materials: absorption, diffuse scattering and specular reflection at a surface. (KS3) • Use of ray model to explain imaging in mirrors, the pinhole camera, the refraction of light and action of convex lens in focusing (qualitative); the human eye. (KS3) • Light transferring energy from source to absorber leading to chemical and electrical effects; photo-sensitive material in the retina and in cameras. (KS3) • Colours and the different frequencies of light, white light and prisms (qualitative only); differential colour effects in absorption and diffuse reflection. (KS3)

WHAT PUPILS NEED TO KNOW OR DO TO BE SECURE

Show understanding of a concept using scientific vocabulary correctly

Key learning	Formative Assessment
• Light appears to travel in straight lines, and we see objects when light from them goes into our eyes. The light may come directly from light sources, but for other objects some light must be reflected from the object into our eyes for the object to be seen. • Objects that block light (are not fully transparent) will cause shadows. Because light travels in straight lines the shape of the shadow will be the same as the outline shape of the object.	• Can describe, with diagrams or models as appropriate, how light travels in straight lines either from sources or reflected from other objects into our eyes • Can describe, with diagrams or models as appropriate, how light travels in straight lines past translucent or opaque objects to form a shadow of the same shape
Scientific vocabulary	
As for Year 3- Light, light source, dark, absence of light, transparent, translucent, opaque, shiny, matt, surface, shadow, reflect, mirror, sunlight, dangerous straight lines, light rays	

Common misconceptions	
Some children may think: we see objects because light travels from our eyes to the object.	
Apply knowledge in familiar related contexts, including a range of enquiries	
Lessons	Summative Assessment
Key Question: Do taller children make larger shadows? Which objects in our local environment produce the widest shadows? Pattern seeking WALT explain and determine how a shadow is formed. Key Question: How does light travel? Research WALT explain that light travels in straight lines (making periscopes). WALT explain how our periscope works. WALT label the main parts of the human eye and explain their functions. WALT explain how we see light sources and non-light sources. WALT explain how white light is made up of a spectrum of different colours.(Spinner wheels) Key Question: How does the angle of a light ray hitting a mirror affect the angle at which is reflects off the surface? Fair test WALT explain that light travels in a straight line e.g. shining a torch down a bent and straight hose pipe, shining a torch through different shaped holes in card.	- Can explain how evidence from enquiries shows that light travels in straight lines - Can predict and explain, with diagrams or models as appropriate, how the path of light rays can be directed by reflection to be seen, e.g. the reflection in car rear view mirrors or in a periscope Can predict and explain, with diagrams or models as appropriate, how the shape of shadows can be varied
Scientific enquiry elements covered during this topic:	
- Pattern seeking - Research - Fair tests	

	Year - 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.	6	Topic	Electricity
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Prior learning	Future learning
- Identify common appliances that run on electricity. (Y4 - Electricity) - Construct a simple series electrical circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers. (Y4 - Electricity) - 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. (Y4 - Electricity) - Recognise that a switch opens and closes a circuit and associate this with whether or not a lamp lights in a simple series circuit. (Y4 - Electricity) - Recognise some common conductors and insulators, and associate metals with being good conductors. (Y4 - Electricity)	- Electric current, measured in amperes, in circuits, series and parallel circuits, currents add where branches meet and current as flow of charge. (KS3) - Potential difference, measured in volts, battery and bulb ratings; resistance, measured in ohms, as the ratio of potential difference (p.d.) to current. (KS3) - Differences in resistance between conducting and insulating components (quantitative). (KS3) - Static electricity. (KS3)

WHAT PUPILS NEED TO KNOW OR DO TO BE SECURE	
Show understanding of a concept using scientific vocabulary correctly	
Key learning	Formative Assessment
- Adding more cells to a complete circuit will make a bulb brighter, a motor spin faster or a buzzer make a louder sound. If you use a battery with a higher voltage, the same thing happens. Adding more bulbs to a circuit will make each bulb less bright. Using more motors or buzzers, each motor will spin more slowly and each buzzer will be quieter. - Turning a switch off (open) breaks a circuit so the circuit is not complete and electricity cannot flow. Any bulbs, motors or buzzers will then turn off as well. - You can use recognised circuit symbols to draw simple circuit diagrams.	- Can make electric circuits and demonstrate how variation in the working of particular components, such as the brightness of bulbs, can be changed by increasing or decreasing the number of cells or using cells of different voltages - Can draw circuit diagrams of a range of simple series circuits using recognised symbols
Scientific vocabulary	
Circuit, complete circuit, circuit diagram, circuit symbol, cell, battery, bulb, buzzer, motor, switch, voltage N.B. Children do not need to understand what voltage is, but will use volts and voltage to describe different batteries. The words “cells” and “batteries” are now used interchangeably.	

Common 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.

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

Lessons

Summative Assessment

Key Question: Which materials are insulators and which are conductors? Comparative tests.

WALT describe the function of electrical components and match them to their symbols (switches, bulbs, buzzers, motors, cells and wires).

WALT investigate insulators and conductors.

Key Question: How does the voltage of the batteries in a circuit affect the brightness of the lamp? Fair tests

WALT investigate the effect of changing the number and voltage of cells in an electrical circuit. WALT compare the circuits (brightness).

WALT create a wire loop game and explain how it works.

WALT predict whether an electrical circuit will function and suggest ways of improving it.

WALT use symbols to create circuit diagrams to represent electrical circuits.

Key Question: Who is Thomas Edison? (Research)

WALA Thomas Edison

Scientific enquiry elements covered during this topic:

- **Observations over time**
- **Comparative tests**
- **Fair tests**

- Can incorporate a switch into a circuit to turn it on and off
 - Can change cells and components in a circuit to achieve a specific effect
 - Can communicate structures of circuits using circuit diagrams with recognised symbols
 - Can devise ways to measure brightness of bulbs, speed of motors, volume of a buzzer during a fair test
- Can predict results and answer questions by drawing on evidence gathered

