Science Curriculum

Year One - Animals Including Humans

National Curriculum Statements:
• 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.

Prior Learning:	Future Learning:
EYFS: • Use all their senses in hands-on exploration of natural materials. • Name and describe people who are familiar to them	**Year 2:** • 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. **Year 6:** • Describe how living things are classified into broad groups according to common observable characteristics and based on **similarities and differences**, including microorganisms, plants and animals. • Give reasons for classifying plants and animals based on specific characteristics

Possible misconceptions	Assessment opportunities:
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.	• **Labelling activities** – Children label parts of the human body and match body parts to the correct senses • **Sorting activities** – Children sort animals into groups such as mammals, birds, fish, reptiles and amphibians • **Discussion activities** – Children compare humans and animals and identify **similarities and differences** • **Identification activities** – Children identify carnivores, herbivores and omnivores from pictures and descriptions • **Observation activities** – Children observe and describe body parts and animal features using scientific vocabulary • **Drawing and labelling** – Children draw and label an animal or human body correctly

Animals Including Humans				
Enquiry Question: How does my body work and how can I keep it healthy?				
Lesson objectives	**Knowledge**	**Skills**	**Working Scientifically**	**Vocabulary**
				head eyes ears nose mouth tongue teeth arms hands legs feet senses sight hearing smell taste touch mammal fish amphibian reptile bird carnivore herbivore omnivore
To identify and name parts of the human body	• Humans have different body parts • Humans have key parts in common, but these vary from person to person. • Humans have different body parts than some animals (e.g. tail, fur, fins etc) • Main parts include: ○ Head (eyes, ears, nose, mouth, tongue, teeth), neck, shoulders, arms, hands, body, legs, feet, fingers, toes, wrists, knees • Humans are animals	**Observing** body parts closely Identifying and naming body parts **Sorting and grouping** body parts **Recording** using drawings and labels **Comparing** humans and animals	• **Asking** simple scientific questions about humans and animals. • **Observing** body parts closely using mirrors, pictures and models. • **Sorting and grouping** body parts. • **Recording** findings using labels, drawings and matching activities. • Talking about **similarities and differences** between humans and animals.	

To identify the five senses and their body parts	• Five senses:
	  ○ sight (with our eyes)
	  ○ hearing (within our ears)
	  ○ smell (within our nose)
	  ○ taste (our tongue within our mouth)
	  ○ touch (can be any body part)
	•
		Observing body parts closely
		Identifying and naming body parts
		Sorting and grouping body parts
		Recording using drawings and labels
		Comparing humans and animals
			• **Asking** simple scientific questions about the senses.
			• **Observing** objects closely using sight, touch, smell, hearing and taste.
			• **Sorting** objects according to the senses used.
			• **Recording** findings using pictures and simple charts.
			• Explaining observations using simple scientific vocabulary.	

To investigate how we use our sense of sight	• We use our eyes to see colours, shapes, **patterns** and movement • Identify the various parts: eyelid, eyelash, pupil and iris. • Some people need glasses to help them see • Light helps us to see	**Observing** carefully. Describing objects using visual features. **Comparing** what can and cannot be seen clearly. Using descriptive vocabulary.	• **Observing** objects closely using sight. • Carrying out **simple investigations** using light and dark. • **Recording** observations using drawings and labels. • Talking about **patterns noticed**.	
To investigate how we use our sense of hearing	• We hear sounds using our ears • Sounds can be loud, quiet, high or low. • Sounds are made when objects vibrate.	Identifying different sounds. **Comparing** sounds. Using scientific vocabulary to describe sounds. Listening carefully.	• **Asking** questions about sound. • **Observing** and identifying sounds in the environment. • Carrying out **simple investigations** into sound. • **Comparing** different sounds.	

	• Sometimes people need help with their hearing (hearing aids, sign language, lip reading)		• **Recording** findings using simple tables or pictures.	
To investigate how we use our sense of taste	• We taste using our tongue. • Our tongue is covered in taste buds. • Foods can taste sweet, salty, sour or bitter. • Taste helps us enjoy and identify foods.	Describing tastes. **Comparing** foods. Grouping foods by taste. Using scientific vocabulary accurately.	• **Asking** scientific questions about taste. • **Observing** and **comparing** foods carefully. • Gathering information through simple taste **investigations**. • **Recording** findings using charts and pictograms	
To investigate how we use our sense of touch	• We use our skin to feel, not just our hands • Objects can feel rough, smooth, hard, soft, hot or cold. • Touch helps keep us safe (if something is hot or cold)	Describing textures and materials. **Comparing** objects using touch. **Sorting** objects by properties. Using descriptive vocabulary.	• **Observing** objects closely using touch. • **Comparing** textures and materials. • **Sorting and grouping** objects by how they feel. • **Recording** findings using tables and labelled drawings.	
To investigate how we use our sense of smell	• We smell using our nose. • Some smells are pleasant and some are unpleasant. • Smell can help warn us about danger.	Identifying smells. **Comparing** different smells. Describing smells using vocabulary. Talking about observations.	• **Asking** questions about smells. • **Observing** and identifying different smells safely. • **Comparing** and grouping smells. • **Recording** findings using simple charts and discussion.	
To identify and name different types of animals	• Animals all have specific names • There are 5 groups of animals (fish, amphibians, reptiles, birds and mammals) • Animals can be carnivores, herbivores or omnivores • Carnivore – eats meat • Herbivore – eats plants • Omnivores – eats both plants and meat • Jane Goodall observed chimpanzees carefully to learn about animal behaviour and how animals are similar to humans.	**Observing** body parts closely Identifying and naming body parts **Sorting and grouping** body parts **Recording** using drawings and labels **Comparing** humans and animals	• **Asking** simple scientific questions about animal groups. • **Observing** animal features closely using pictures and videos. • **Sorting and grouping** animals based on observable characteristics. • **Recording** findings using **sorting** diagrams and tables. • **Identifying similarities and differences** between animal groups.	
To describe the features of mammals	• Mammals – has hair or fur, have a back bone and are warm blooded e.g. humans, dogs, monkeys, lion	**Observing** body parts closely Identifying and naming body parts **Sorting and grouping** body parts **Recording** using drawings and labels	• **Asking** simple scientific questions about mammals. • **Observing** mammals closely using pictures, videos and models.	

		Comparing humans and animals	• **Sorting and grouping** mammals and non-mammals. • **Recording** findings using simple classification charts. • **Identifying patterns** in animal features.	
To describe the features of fish	• Fish – gills, fins and scales and found in aquatic environments. E.g. shark, tuna, clownfish, salmon	**Observing** body parts closely Identifying and naming body parts **Sorting and grouping** body parts **Recording** using drawings and labels **Comparing** humans and animals	• **Asking** simple scientific questions about fish. • **Observing** fish carefully using images and videos. • **Sorting and grouping** fish according to features. • **Recording** findings using labelled diagrams. • **Identifying similarities and differences** between fish and other animals.	
To describe the features of amphibians	• Amphibians – live on both land and water and have slimy skin e.g. frogs, toads, salamanders	**Observing** body parts closely Identifying and naming body parts **Sorting and grouping** body parts **Recording** using drawings and labels **Comparing** humans and animals	• **Asking** simple scientific questions about amphibians. • **Observing** amphibians closely using pictures and videos. • **Sorting and grouping** animals by habitat and features. • **Recording** findings using simple charts. • **Identifying patterns** in animal characteristics.	
To describe the features of reptiles	• Reptiles – scaly skin, found in warm climates e.g. snakes, lizards, turtles	**Observing** body parts closely Identifying and naming body parts **Sorting and grouping** body parts **Recording** using drawings and labels **Comparing** humans and animals	• **Asking** simple scientific questions about reptiles. • **Observing** reptile features carefully. • **Sorting and grouping** reptiles and non-reptiles. • **Recording** findings using drawings and labels. • **Comparing** reptiles with other animal groups.	
To describe the features of birds	• Birds – feathers, beaks and wings and some are able to fly e.g. eagles, owls, parrots, penguins	**Observing** body parts closely Identifying and naming body parts **Sorting and grouping** body parts **Recording** using drawings and labels	• **Asking** simple scientific questions about birds.	

		Comparing humans and animals	• **Observing** bird features carefully using outdoor observations and images. • **Sorting and grouping** birds according to features. • **Recording** findings using simple diagrams. • **Identifying similarities and differences** between birds and other animals.	

Year One – Everyday Materials

National Curriculum Statements:
• 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:
EYFS: • Use all their senses in hands-on exploration of natural materials. • Explore collections of materials with similar and/or different properties. • Talk about the differences between materials and changes they notice.	**Year 2:** • 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

Possible misconceptions	Assessment opportunities:
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.	• **Labelling activities** – Children label parts of the human body and match body parts to the correct senses • **Sorting activities** – Children sort animals into groups such as mammals, birds, fish, reptiles and amphibians • **Discussion activities** – Children compare humans and animals and identify **similarities and differences** • **Identification activities** – Children identify carnivores, herbivores and omnivores from pictures and descriptions • **Observation activities** – Children observe and describe body parts and animal features using scientific vocabulary • **Drawing and labelling** – Children draw and label an animal or human body correctly

Everyday Materials				
Enquiry Question: What are objects made from and how are materials different?				
Lesson objectives	**Knowledge**	**Skills**	**Working Scientifically**	**Vocabulary**
				object material wood
To identify and name everyday materials	• A material is what an object is made from	**Observing** materials closely Identifying everyday materials **Sorting and grouping** materials	• **Asking** simple scientific questions about materials.	

	• Objects can be made from different materials • Common materials: • wood, plastic, metal, glass, rock, water, fabric, paper	Recording using drawings and labels Comparing similarities and differences	• Observing materials closely using senses. • Sorting and grouping objects by material. • Recording findings using pictures and labels. • Talking about similarities and differences between materials.	plastic glass metal water rock paper fabric waterproof absorbent transparent opaque hard soft rough smooth stretchy stiff
To distinguish between an object and the material it is made from	• Understand that all objects are made from materials • Identify what material an object is made from • Understand that different objects can be made from the same material • Understand that objects can be made from more than one material (table – object made of metal and wood)	Observing objects carefully Identifying objects and materials Matching objects to materials Sorting and grouping objects Recording using labels and diagrams	• Asking questions about objects and materials. • Observing objects closely to identify materials. • Sorting and grouping objects and materials. • Recording findings using matching activities and labelled diagrams. • Explaining observations using simple scientific vocabulary.	
To describe the properties of everyday materials	• Name and describe simple physical properties of materials • Hard, soft, stretchy, shiny, full, rough, smooth, flexible (bendy), inflexible (not bendy), transparent (see through), opaque (cannot see through) • Identify these properties when looking at everyday objects and materials • Compare two materials and say how their properties are different	Observing materials using the senses Identifying material properties Comparing materials Sorting materials by properties Recording using simple charts and tables	• Asking scientific questions about material properties. • Observing and testing materials carefully. • Sorting materials according to properties. • Recording findings using simple tables and charts. • Comparing materials and describing differences.	
To compare and group materials	• Materials can be similar or different • We can compare using properties • Materials can be grouped in different ways • Grouping is based on what we can see/feel	Observing similarities and differences Comparing materials Sorting and grouping materials Choosing ways to classify materials Recording using sorting diagrams	• Asking questions about similarities and differences between materials. • Observing materials closely. • Sorting and grouping materials using chosen criteria. • Recording findings using sorting diagrams. • Explaining how materials have been grouped.	
To explore which materials are best	• Understand that some objects are absorbent and some are waterproof		• Asking simple scientific questions about suitable materials.	

for different objects	• Predict if an object is absorbent • Observe and test objects to find out if they are absorbent • Charles Macintosh invented waterproof materials to help keep people dry. Which material would be best for an umbrella? Put a teaspoon of water on a tray and then try and wipe it up with the material they are testing. If there is water left on the tray it is not absorbent and if there is no water on the tray it is absorbent. Materials (sponge, paper, cloth, tin foil and plastic bag)		• Making simple **predictions**. • Performing simple comparative **investigations**. • **Observing** and measuring results carefully. • **Recording** findings using tables and pictures. • Explaining results **using evidence**.	

Year One - Plants

National Curriculum Statements:
• 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

Prior Learning:	Future Learning:
EYFS: • Plant seeds and care for growing plants. • Understand the key features of the life cycle of a plant and an animal. • Begin to understand the need to respect and care for the natural environment and all living things. • Explore the natural world around them. • Recognise some environments that are different to the one in which they live.	**Year 2:** • 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. • Identify and name a variety of plants and animals in their habitats, including microhabitats. **Year 3:** • Identify and describe the functions of different parts of flowering plants: roots, stem/trunk, leaves and flowers • Investigate the way in which water is transported within plants

Possible misconceptions	Assessment opportunities:
Some children may think: • plants are flowering plants grown in pots with coloured petals and leaves and a stem • trees are not plants • all leaves are green • all stems are green • a trunk is not a stem • blossom is not a flower	• **Identification activities** – Children identify and name common plants and trees • **Labelling activities** – Children label parts of a flowering plant correctly • **Sorting activities** – Children sort trees into deciduous and evergreen groups • **Observation activities** – Children observe plants closely and describe **similarities and differences** • **Outdoor learning activities** – Children identify plants growing in the local environment • **Drawing and labelling** – Children draw and label a plant or tree using scientific vocabulary

Plants				
Enquiry Question: How are plants the same and different?				
Lesson objectives	**Knowledge**	**Skills**	**Working Scientifically**	**Vocabulary**
				plant tree flower leaf
To identify and name common plants	• Understand that plants are living things • Plants grow in many places • Plants are not animals even though they are living	**Observing** plants closely Identifying and naming plants **Sorting and grouping** plants **Comparing similarities and differences**	• **Asking** simple scientific questions about plants. • **Observing** plants closely using the local environment.	

	• Some plants are trees • Some plants are flowers • Identify and name common plants (rose, daisy, grass, oak tree)	Recording using drawings and labels	• Sorting and grouping plants into categories. • Recording findings using drawings and labels. • Identifying similarities and differences between plants.	stem trunk root branch petal seed fruit bulb wild plant garden plant deciduous evergreen
To identify and name parts of a plant	• Identify the parts of a plants and trees • Roots, stem/trunk, leaves, flowers, petal, branches, fruits,	Observing plant structures carefully Identifying parts of a plant Labelling diagrams accurately Comparing plant structures Recording using drawings and labels	• Asking scientific questions about plant parts. • Observing plant structures carefully. • Identifying and labelling parts of plants. • Recording findings using labelled diagrams. • Comparing different plant structures.	
To describe the similarities and differences of plants	• Plants can look different • They can be different in: ○ Size, colour, leaf shape, tree/flower	Observing plants closely Comparing plant features Sorting and grouping plants Describing similarities and differences Recording using comparison charts	• Asking questions about how plants are similar and different. • Observing plants carefully. • Comparing plant features. • Recording findings using comparison charts. • Identifying patterns between plants.	
To know that fruits and vegetables come from plants	• Understand that fruit trees are plants • Understand that vegetables are plants • Explain that some plants are a source of food • Investigate different plants and seeds we eat • George Washington Carver discovered many ways plants can be used for food and farming.	Observing fruits, vegetables and seeds Identifying foods that come from plants Sorting foods into categories Comparing different plant foods Recording using simple tables and charts	• Asking scientific questions about foods from plants. • Observing fruits, vegetables and seeds closely. • Sorting foods into categories. • Recording findings using simple tables. • Explaining observations using scientific vocabulary.	
To know the difference between deciduous and evergreen trees	• Know that deciduous trees change throughout the year • Explain how deciduous trees change throughout the year • Make a comparison between a deciduous tree and an evergreen tree	Observing trees carefully Identifying tree features Comparing different trees Sorting trees into groups Recording using drawings and labels	• Asking questions about trees. • Observing trees closely throughout the seasons. • Sorting and grouping trees by features. • Recording findings using drawings and labels. • Identifying patterns in seasonal changes.	
To investigate what plants grow in and around our school	• Plants grow in different places • We can find plants around us	Observing plants in the local environment Identifying and naming plants Sorting and grouping plants Gathering and Recording data Talking about patterns observed	• Asking simple scientific questions about local plants. • Observing plants in the real world. • Gathering and Recording data using tally charts and drawings. • Sorting and grouping plants. • Talking about patterns observed.	

Year One – Seasonal Changes

National Curriculum Statements:
• Observe changes across the four seasons. • Observe and describe weather associated with the seasons and how day length varies.

Prior Learning:	Future Learning:
EYFS: • Understand the key features of the life cycle of a plant and an animal. • Explore the natural world around them. • Describe what they see, hear and feel whilst outside. • Understand the effect of changing seasons on the natural world around them.	**Year 3:** • Recognise that light from the sun can be dangerous and that there are ways to protect their eyes. **Year 5:** • 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) **KS3:** • The seasons and the Earth's tilt, day length at different times of year, in different hemispheres.

Possible misconceptions	Assessment opportunities:
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	• **Sorting activities** – Children sort pictures and objects into the correct seasons • **Observation activities** – Children observe and describe seasonal and weather changes over time • **Discussion activities** – Children compare seasons and explain **similarities and differences** • **Recording activities** – Children record weather using symbols, charts and pictures • **Outdoor learning activities** – Children identify seasonal changes in the local environment • **Drawing and labelling** – Children draw and label features of a chosen season using scientific vocabulary

Seasonal Changes				
Enquiry Question: How does the world around us change across the year?				
Lesson objectives	**Knowledge**	**Skills**	**Working Scientifically**	**Vocabulary**

To identify and name the four seasons Cross curricular link: Geography	• name the four seasons (winter, spring, summer, autumn) • describe what happens to the weather in each season • compare the seasons by looking at how they are different • each season has typical features	**Observing** seasonal changes carefully Identifying features of each season **Comparing** seasons **Sorting** seasonal images and objects **Recording** using pictures and charts	• **Asking** simple scientific questions about seasons. • **Observing** seasonal changes carefully. • **Sorting and grouping** seasonal features. • **Recording** findings using pictures and charts. • **Identifying patterns** across the year.	spring summer autumn winter weather sunny rainy windy cloudy snowy frost ice temperature sunrise sunset day length
To understand changes that take place in Autumn	• Name some key features of autumn (cooler weather, leaves falling, animals hibernating) • Describe how the autumn weather affects plants and animals • Explain why and how some animals hibernate	**Observing** autumn changes closely Identifying seasonal features **Comparing** autumn with other seasons **Recording** using drawings and simple tables Explaining observations using scientific vocabulary	• **Asking** questions about autumn changes. • **Observing** weather, plants and animals carefully. • **Recording** findings using drawings and simple tables. • **Identifying patterns** in seasonal change. • Explaining observations using scientific vocabulary.	
To understand the changes that take place in winter	• Name some key features of winter (coldest season, short days, snow or ice or frost, trees losing all their leaves and animals hibernate or migrate) • Understand that the length of the day changes in winter • Discuss the differences between winter and other seasons	**Observing** winter weather and environmental changes Identifying key features of winter **Comparing** winter with other seasons **Recording** using charts and drawings Talking about seasonal **patterns**	• **Asking** scientific questions about winter weather. • **Observing** changes in the environment. • **Comparing** winter with other seasons. • **Recording** findings using charts and drawings. • **Identifying patterns** in day length and weather.	
To understand the changes that take place in Spring	• Name some key features of spring (fays become longer, weather changes a lot and it is unpredictable, flowers begin to grow again and some baby animals are born) • Understand the different types of weather in spring • Describe how the spring weather affects plants and animals	**Observing** changes in plants, animals and weather Identifying features of spring **Comparing** spring with other seasons **Recording** observations over time Talking about **patterns** in growth and weather	• **Asking** questions about spring changes. • **Observing** plants, weather and animals carefully. • **Recording** findings over time. • **Comparing** spring with other seasons. • **Identifying patterns** in growth and weather.	
To understand the changes that take place in Summer	• Understand how plants and animals change during summer (warmer weather, sunny weather, longer days, different clothes,)	**Observing** summer weather and environmental changes Identifying features of summer **Comparing** summer with other seasons **Recording** using pictures and charts	• **Asking** scientific questions about summer. • **Observing** summer weather and environmental changes.	

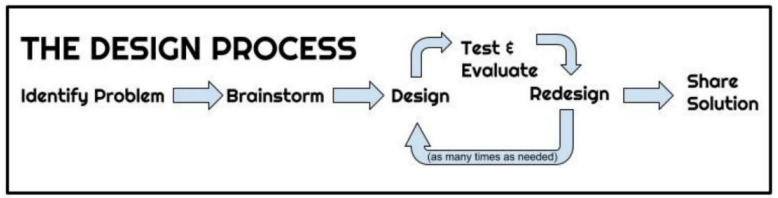
	• Understand how to protect ourselves during the summer (shade, sun cream, cool drinks) • Make comparisons between winter and summer	Explaining seasonal **patterns** using scientific vocabulary	• **Comparing** summer with other seasons. • **Recording** findings using pictures and tables. • Explaining seasonal **patterns**.	
To explain how the weather and seasons change Cross curricular link: Geography	• Weather is a description of what the conditions are like in a particular place. • Examples of weather include sunny, rainy, windy, warm, cold, cloudy, drizzle, snow, stormy (with thunder and lightning) • The weather can change rapidly in one day (e.g. sunny morning and rainy afternoon) • The UK and our local area have daily weather **patterns**. • Describe each season and the weather we see in it • Luke Howard named different types of clouds to help people understand weather **patterns**.	**Observing** different types of weather Identifying weather **patterns** **Comparing** weather across seasons **Recording** using simple charts and tables Talking about seasonal changes over time	• **Asking** scientific questions about weather. • **Observing** weather **patterns** over time. • **Recording** findings using simple charts. • **Comparing** seasonal weather. • **Identifying patterns** in weather changes.	
To observe and record seasonal changes Cross curricular link: Geography and Maths	• We can collect information about seasonal change • Looking over time helps us notice **patterns**	**Observing** changes over time carefully Identifying seasonal **patterns** Measuring simple weather changes Gathering and **Recording** data Using charts, tables and drawings to present findings	• **Asking** questions about changes across the year. • **Observing** changes over time carefully. • Measuring and **Recording** weather data simply. • **Recording** findings using charts, tables and drawings. • **Identifying patterns** in seasonal change.	

Year One- Title of Unit: STEAM Project

National Curriculum Statements:
• 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 • ask simple questions and recognise that they can be answered in different ways • observe closely, using simple equipment

Prior Learning:	Future Learning:
EYFS: Exploring and selecting materials during continuous provision and EYFS junk modelling Talking about weather and seasonal changes in EYFS Building simple structures using construction equipment Exploring how materials feel and behave through play Sharing ideas and explaining thinking through talk and role play	**Year 2** • Identify and compare the suitability of everyday materials for particular uses • Explore how shapes of solid objects can be changed by squashing, bending, twisting and stretching • Design products for a purpose using suitable materials **Year 3** • Compare and group rocks and soils based on properties • Explore forces and stability in structures • Develop fair testing and recording skills in scientific enquiries

Possible misconceptions	Assessment opportunities:
• All materials keep water out • Heavy materials are always the strongest • Bigger shelters are always better shelters • A shelter only protects from rain • Paper and card are the same material • Structures do not need strong shapes or supports • Testing something once always gives a fair result	• Identify features needed for a successful shelter • Name and describe properties of materials using scientific vocabulary • Choose suitable materials for a purpose and explain choices • Take part in simple comparative tests • Explain what worked well in a structure and why • Suggest improvements after testing • Communicate ideas through labelled diagrams and discussion • Work collaboratively to build and improve a model shelter

STEAM project				
Enquiry Question: Can we build a shelter to keep Beegu dry and safe?				
Lesson objectives	**Knowledge**	**Skills**	**Working Scientifically**	**Vocabulary**
To identify the features of a shelter and explain why shelters are important in different weather conditions	• A shelter protects living things from weather • Shelters can protect from rain, wind, sun and cold • Shelters need important features such as roofs and walls 	• - Identifying features - Discussing ideas - Sorting and comparing shelters	• - Asking simple questions • Identifying and classifying • Using observations and ideas to suggest answers	• shelter • protect • weather • material • waterproof • strong • structure • stable • design • build • test • improve
To investigate and identify the best materials for a weather-proof shelter	• Materials have different properties • Some materials are waterproof • Some materials are strong or weak • Suitable materials are chosen for different purposes	• Testing materials • - Comparing results • - Recording findings	• - Performing simple test • Observing closely using simple equipment • Recording observations • Using observations to answer questions	
To explore which shapes and structures make shelters stronger	• Shapes affect the strength and stability of structures • Some structures are stronger than others • Triangles and rolled shapes can make structures stronger	• - Building simple structures • - Comparing strength • - Problem solving	• - Performing simple comparative tests • Observing closely • Using observations to suggest answers	
To design a weather-proof shelter using suitable materials and shapes	• Engineers plan designs before building • Designs should match the purpose • Suitable materials and shapes improve effectiveness	• - Designing • - Labelling plans • - Explaining choices	• Asking simple questions • Using observations and ideas to suggest answers	
To build a weather-proof shelter following a design plan	• Structures can be made stronger by joining materials carefully • Different joining methods affect stability	• - Constructing • - Selecting materials • - Measuring and assembling	• Observing closely • Performing simple tests	
To test and evaluate a shelter and	• Structures can be improved after testing • Engineers evaluate and redesign products	• Testing • - Evaluating • - Improving designs	• Performing simple tests • Using observations and ideas to suggest answers	

suggest improvements		• - Communicating findings	• Gathering and recording data to help answer questions	

Year Two – Animals Including Humans

National Curriculum Statements:
• 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.

Prior Learning:	Future Learning:
Year 1: • Identify and name a variety of common animals that are carnivores, herbivores and omnivores. • Identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense.	**Year 3:** • 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. **Year 5:** • 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 **Year 6:** •Recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function

Possible misconceptions	Assessment opportunities:
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.	• **Sorting activities** – Children sort foods into healthy and unhealthy groups and identify different food groups • **Timeline activities** – Children place stages of human and animal life cycles into the correct order • **Investigation activities** – Children investigate how exercise affects the body and record changes • **Discussion activities** – Children explain how humans and animals stay healthy and survive • **Observation activities** – Children observe **similarities and differences** between adults and offspring • **Drawing and labelling** – Children draw and label a simple life cycle correctly

Animals Including Humans				
Enquiry Question: What do animals (including humans) need to survive and stay healthy?				
Lesson objectives	**Knowledge**	**Skills**	**Working Scientifically**	**Vocabulary**
To describe the needs of humans for survival	• Humans need water, food and air to survive. • Humans also need shelter and sleep to stay healthy. • Without these basic needs, humans cannot survive. • Different foods help our bodies in different ways.	Identifying basic human needs. **Explaining why** humans need food, water and air. **Sorting** needs and wants. Discussing how humans stay healthy	• **Asking** scientific questions about survival. • **Observing** and **comparing** human needs. • **Sorting** needs and wants. • **Recording** findings using simple tables and charts. • **Explaining why** humans need food, water and air.	
To describe the basic stages of human life	• Humans grow and change as they get older. • Human life stages include baby, toddler, child, teenager, adult and elderly person. • As humans grow, their bodies and abilities change.	Sequencing life stages. **Observing** changes over time. **Comparing** different stages of life. Using scientific vocabulary accurately.	• **Asking** questions about growth and change. • **Observing** changes over time. • Sequencing stages of life. • **Recording** findings using timelines and diagrams. • **Identifying patterns** in human growth.	
To explore the importance of eating healthily	• Healthy foods help our bodies grow and stay strong. • Some foods should only be eaten sometimes. • Eating too much sugar can damage teeth and health. • Different foods give us energy and nutrients.	Identifying healthy and unhealthy foods. Grouping foods into categories. Making simple choices about healthy eating. Explaining reasons for choices.	• **Asking** scientific questions about healthy eating. • **Sorting** foods into categories. • **Recording** findings using charts. • **Comparing** healthy and unhealthy foods. • Explaining choices **using evidence**.	
To describe what a healthy, balanced diet looks like	• A balanced diet includes different types of foods. • The main food groups are fruit and vegetables, carbohydrates, protein, dairy and oils/spreads. • Drinking water is important for health. • Eating a variety of foods helps keep us healthy.	**Sorting** foods into food groups. Designing healthy meals. **Comparing** meals and discussing improvements. Using scientific vocabulary to explain choices.	• **Asking** questions about food groups. • Identifying and classifying foods. • **Recording** findings using food charts and tables. • **Comparing** meals and diets. • Explaining healthy choices using scientific vocabulary.	
To investigate the impact of exercise on our bodies	• Exercise helps keep our bodies healthy. • Exercise makes our hearts beat faster and increases breathing rate.	**Observing** changes in the body after exercise. Measuring pulse/breathing informally. **Recording** observations.	• **Asking** scientific questions about exercise.	

	• Exercise strengthens muscles and bones. • Rest is important after exercise.	**Comparing** before and after exercise.	• Planning and carrying out **simple investigations**. • **Observing** and measuring body changes after exercise. • **Recording** findings using tables and charts. • **Identifying patterns** in results.	
To investigate the importance of hygiene	• Hygiene helps stop the spread of germs. • Washing hands removes germs. • Cleaning our bodies and brushing teeth keeps us healthy. • Poor hygiene can cause illness. • Louis Pasteur discovered that germs can spread disease and showed the importance of hygiene and handwashing.	**Observing** how germs spread. Explaining good hygiene routines. **Comparing** clean and unclean scenarios. Following simple hygiene **investigations**.	• **Asking** scientific questions about germs and hygiene. • **Observing** how germs spread through **investigations**. • Performing simple comparative **investigations**. • **Recording** findings using charts and diagrams. • Explaining how hygiene keeps us healthy.	
To describe the needs of animals for survival	• Animals need food, water and air to survive. • Different animals need different foods. • Animals need suitable habitats for shelter and protection. • Survival needs are similar for humans and animals.	Identifying animal needs. **Comparing** survival needs of different animals. **Sorting** animals by diet. Explaining how habitats help animals survive.	• **Asking** scientific questions about animal survival. • **Observing** and **comparing** the needs of different animals. • **Sorting** animals by diet and habitat. • **Recording** findings using tables and **sorting** charts. • Explaining how habitats help animals survive.	
To understand that animals have offspring	• Animals have babies called offspring. • Offspring grow into adults. • Some offspring look similar to their parents. • Different animals have different names for their young.	Matching animals to offspring. **Comparing** adults and young. **Observing similarities and differences**. Using scientific vocabulary correctly.	• **Asking** questions about animal offspring. • **Observing similarities and differences** between adults and young. • **Sorting** and matching animals with their offspring. • **Recording** findings using diagrams and labels. • **Identifying patterns** in animal growth.	

To explore the life cycle of a chicken	• Chickens begin life as eggs. • Chicks hatch from eggs and grow into adult chickens. • Adult chickens can lay eggs. • Life cycles repeat.	Sequencing stages of a life cycle. **Observing** change over time. Labelling diagrams. **Comparing** life stages.	• **Asking** scientific questions about life cycles. • **Observing** changes over time using pictures and videos. • Sequencing stages of a life cycle. • **Recording** findings using labelled diagrams. • **Identifying patterns** in growth and development.	
To describe the life cycle of a butterfly	• Butterflies have four life cycle stages: egg, caterpillar, chrysalis and butterfly. • Butterflies change shape during metamorphosis. • Life cycles repeat continuously.	Sequencing life cycle stages. **Comparing** stages. **Observing** changes over time. **Recording** findings using diagrams	• **Asking** scientific questions about metamorphosis. • **Observing** changes over time carefully. • Sequencing stages of the butterfly life cycle. • **Recording** findings using diagrams and charts. • **Identifying patterns** in growth and change.	
To explore the life cycle of a frog	• Frogs begin life as eggs called frogspawn. • Tadpoles hatch from frogspawn. • Tadpoles grow legs and become frogs. • Frogs change throughout their life cycle.	Sequencing frog life cycle stages. **Comparing** tadpoles and frogs. **Observing** changes over time. Labelling diagrams.	• **Asking** scientific questions about amphibian life cycles. • **Observing** changes over time using pictures and models. • Sequencing stages accurately. • **Recording** findings using labelled diagrams and charts. • **Identifying patterns** in the frog life cycle.	

Year Two – Living Things and their Habitats

National Curriculum Statements:
• 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

Prior Learning:	Future Learning:
Year 1: • Identify and name a variety of common wild and garden plants, including deciduous and evergreen trees. • Identify and describe the basic structure of a variety of common flowering plants, including trees. • Identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals • Identify and name a variety of common animals that are carnivores, herbivores and omnivores. • Describe and compare the structure of a variety of common animals (fish, amphibians, reptiles, birds and mammals, including pets) • Observe changes across the four seasons.	**Year 4:** • 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. • Construct and interpret a variety of food chains, identifying producers, predators and prey.

Possible misconceptions	Assessment opportunities:
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'	• **Sorting activities** – Children sort living things into habitats and microhabitats • **Classification activities** – Children identify things that are living, dead and never alive • **Observation activities** – Children observe habitats and identify plants and animals found there • **Food chain activities** – Children construct simple food chains using producers and consumers • **Discussion activities** – Children explain how habitats help living things survive • **Recording activities** – Children record findings using tally charts, tables and diagrams

Living Things and their Habitats				
Enquiry Question: How do habitats help living things survive?				
Lesson objectives	**Knowledge**	**Skills**	**Working Scientifically**	**Vocabulary**

To explore habitats	• A habitat is the natural place where a living thing lives. • Habitats provide living things with what they need to survive. • Different habitats contain different plants and animals. • Common habitats include woodland, ocean, desert, pond and garden. • Sylvia Earle studies ocean habitats and works to protect living things in the sea.	Identifying different habitats. **Observing** features of habitats. Matching animals to habitats. Describing habitats using scientific vocabulary.	• **Asking** scientific questions about where living things live. • **Observing** habitats closely using pictures, videos and outdoor learning. • **Sorting and grouping** habitats by their features. • **Recording** findings using drawings, labels and simple charts. • Explaining how habitats meet the needs of living things.	
To identify and name a variety of plants and animals in common habitats	• Different habitats contain different plants and animals. • Living things are suited to the habitats they live in. • Plants and animals depend on their habitats for food, water and shelter. • Some animals can survive in more than one habitat.	Identifying plants and animals in habitats. Grouping living things by habitat. **Comparing** habitats. **Recording** observations.	• **Asking** scientific questions about living things in habitats. • **Observing** plants and animals carefully. • **Sorting and grouping** living things by habitat. • Gathering and **Recording** data using tally charts and tables. • **Identifying patterns** between habitats and living things.	
To understand why animals live in certain habitats.	• Animals live in habitats that meet their survival needs. • Habitats provide food, water, air and shelter. • Animals are suited to the conditions in their habitats. • Some habitats are hot, cold, wet or dry.	**Explaining why** animals live in certain places. **Comparing** habitats and animals. Matching animals to suitable habitats. Using scientific vocabulary to explain ideas.	• **Asking** scientific questions about survival in habitats. • **Observing** habitat conditions carefully. • **Comparing** habitats and animals. • **Recording** findings using comparison charts. • Explaining how habitats help animals survive.	
To understand what a microhabitat is	• A microhabitat is a very small habitat within a larger habitat. • Microhabitats provide suitable conditions for small living things. • Examples include under logs, under rocks, leaf piles and inside tree bark. • Different microhabitats have different conditions.	Identifying microhabitats. **Observing** small habitats closely. Describing conditions in microhabitats. **Comparing** different microhabitats.	• **Asking** scientific questions about small habitats. • **Observing** microhabitats closely using magnifiers and outdoor exploration. • **Comparing** conditions in different microhabitats. • **Recording** findings using charts and labelled diagrams.	

			• **Identifying patterns** between conditions and living things found.
Identify and name a variety of plants and animals in a microhabitat	• Many small animals live in microhabitats. • Worms, woodlice, spiders, beetles and snails can be found in microhabitats. • Living things are suited to the conditions where they live. • Some microhabitats are damp, dark or warm.	Identifying living things in microhabitats. **Sorting and grouping** animals. **Recording** findings using charts or tally marks. **Comparing** living things found in different places.	• **Asking** scientific questions about organisms in microhabitats. • **Observing** living things closely using simple equipment. • **Sorting and grouping** organisms by features. • Gathering and **Recording** data using tally charts and pictograms. • **Identifying patterns** in where organisms are found.
To compare the difference between things that are living, dead and never alive	• Living things grow, move, breathe, reproduce and need food and water. • Dead things were once alive. • Things that have never been alive were never living. • Examples of living, dead and never alive things can be found in all habitats.	**Sorting** objects into categories. **Observing** characteristics carefully. Explaining reasons for classifications. **Comparing** living and non-living things.	• **Asking** scientific questions about living things. • **Observing** objects and organisms carefully. • **Sorting and grouping** items into categories. • **Recording** findings using classification tables. • Explaining reasons for classifications **using evidence**.
To understand food chains	• Food chains show how animals get their food. • Plants are the start of most food chains because they make their own food. • Animals eat plants or other animals. • Arrows in a food chain mean “is eaten by.” • A simple food chain includes a producer and consumers	Constructing simple food chains. Identifying producers and consumers. Sequencing food chains correctly. Explaining how animals depend on one another.	• **Asking** scientific questions about how animals get food. • **Observing** and identifying producers and consumers. • Sequencing food chains correctly. • **Recording** findings using diagrams and arrows. • Explaining **patterns** and relationships in food chains.

Year Two - Plants

National Curriculum Statements:
• 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:
Year 1: • 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.	**Year 3:** • Identify and describe the functions of different parts of flowering plants: roots, stem/trunk, leaves and flowers • Investigate the way in which water is transported within 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. • Explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal

Possible misconceptions	Assessment opportunities:
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.	• • **Observation activities** – Children observe seeds, bulbs and plant growth over time • **Investigation activities** – Children investigate what plants need to grow and stay healthy • **Prediction activities** – Children predict what will happen to plants in different conditions • **Sequencing activities** – Children sequence the stages of a plant life cycle correctly • **Discussion activities** – Children explain how plants survive in different environments • **Drawing and labelling** – Children draw and label stages of plant growth accurately

Plants				
Enquiry Question: What do plants need to grow and stay healthy?				
Lesson objectives	**Knowledge**	**Skills**	**Working Scientifically**	**Vocabulary**
To understand the difference between seeds and bulbs	Seeds and bulbs both grow into plants. Seeds are usually small and need water and warmth to germinate. Bulbs store food underground to help plants grow. Different plants grow from different seeds and bulbs.	**Observing** seeds and bulbs closely. **Comparing similarities and differences**. **Sorting** seeds and bulbs. Using scientific vocabulary accurately.	**Asking** scientific questions about seeds and bulbs. **Observing** seeds and bulbs closely. **Comparing similarities and differences**. **Recording** findings using labelled diagrams and charts. **Identifying patterns** in plant growth.	seed bulb germination shoot seedling mature plant growth roots stem

To understand how a seed/bulb grows into a plant	Seeds and bulbs grow into mature plants. Germination is when a seed begins to grow. Plants change as they grow. Roots grow first to absorb water. Agnes Arber studied how plants grow and the different parts of plants.	Sequencing stages of plant growth. **Observing** changes over time. Labelling diagrams. **Recording** observations.	**Asking** scientific questions about plant growth. **Observing** changes over time carefully. Sequencing stages of growth. **Recording** findings using diagrams and plant diaries. **Identifying patterns** in plant development.	leaves flower water sunlight warmth nutrients healthy
To investigate what plants need to grow and stay healthy	Plants need water, light, air, warmth and space to grow. Without these conditions, plants may not grow well. Different plants may need different amounts of water and light. Healthy plants have strong stems and green leaves.	Making **predictions**. Setting up **simple investigations**. **Observing** plant growth. **Recording** results using charts or drawings.	**Asking** scientific questions about plant growth. Making simple **predictions**. Planning and carrying out **simple investigations**. **Observing** and measuring plant growth over time. **Recording** findings using tables, charts and drawings. **Identifying patterns** in results.	
To explore the life cycle of a plant	Plants have life cycles. Plants begin as seeds or bulbs. Mature plants produce new seeds. Life cycles repeat continuously.	Sequencing stages of a plant life cycle. **Observing** changes over time. Labelling diagrams. **Comparing** stages in a life cycle.	**Asking** scientific questions about plant life cycles. **Observing** changes over time. Sequencing life cycle stages accurately. **Recording** findings using diagrams and charts. **Identifying patterns** in plant growth and reproduction.	
To understand that plants survive in different environments	Different plants survive in different environments. Some plants need lots of water while others need very little. Plants are suited to the places where they grow. Environment affects how plants grow and survive.	**Comparing** plants from different environments. **Observing** plant features carefully. **Explaining why** plants survive in certain places. Grouping plants by environment.	**Asking** scientific questions about plant survival. **Observing** plant features closely. **Comparing** plants from different environments. **Recording** findings using comparison tables. Explaining **patterns** between environments and plant survival.	
To design an experiment to find out what plants need to grow	Scientists test one thing at a time to make **investigations** fair. Plants can be tested in different conditions. Results help us understand what plants need.	Planning a **simple investigation**. Making **predictions**. **Observing** and measuring changes. **Recording** and discussing results.	**Asking** scientific questions about plant growth. Planning simple comparative **investigations**.	

	Observations should be recorded carefully.		**Observing** and measuring changes carefully. **Recording** findings using charts and tables. **Interpreting results** and explaining conclusions **using evidence**.	

Year Two – Uses of Everyday Materials

National Curriculum Statements:
• 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:
Year 1: • 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.	**Year 3:** • Compare and group together different kinds of rocks on the basis of their appearance and simple physical properties. • Notice that some forces need contact between two objects, but magnetic forces can act at a distance **Year 5:** • 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. • Give reasons, based on evidence from comparative and fair **investigations**, for the particular uses of everyday materials, including metals, wood and plastic.

Possible misconceptions	Assessment opportunities:
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	• **Sorting activities** – Children sort materials based on their properties and uses • **Investigation activities** – Children test materials for strength, stretchiness, absorbency and waterproofing • **Prediction activities** – Children predict which materials will be most suitable for different purposes • **Comparison activities** – Children compare how materials change shape when squashed, bent, twisted or stretched • **Discussion activities** – Children explain why some materials are better suited for certain jobs • **Recording activities** – Children record results using tables, charts and labelled diagrams

Uses of Everyday Materials				
Enquiry Question: Why are some materials better for certain jobs?				
Lesson objectives	**Knowledge**	**Skills**	**Working Scientifically**	**Vocabulary**

To identify different materials and their uses	• Objects are made from different materials. • Different materials are used for different purposes. • Common materials include wood, metal, plastic, glass, fabric, paper and cardboard. • Materials are chosen because of their properties.	Identifying everyday materials. Matching objects to materials. **Explaining why** materials are used for certain objects. Using scientific vocabulary accurately.	• **Asking** scientific questions about materials and objects. • **Observing** materials closely using senses and **simple investigations**. • **Sorting and grouping** objects by material and use. • **Recording** findings using tables, labels and charts. • **Explaining why** certain materials are used for specific objects.	transparent translucent opaque reflective waterproof absorbent flexible rigid squash bend twist stretch suitability strength recycle reuse pollution
To identify and describe properties of materials.	• Materials have different properties. • Materials can be hard, soft, stretchy, rigid, waterproof, transparent or absorbent. • The properties of a material affect how it can be used. • Some materials have more than one property.	**Observing** materials carefully. Describing materials using scientific vocabulary. **Comparing** materials. **Sorting** materials by properties.	• **Asking** scientific questions about material properties. • **Observing** and testing materials carefully. • **Comparing** materials using scientific vocabulary. • **Recording** findings using charts and comparison tables. • **Identifying patterns** in material properties.	
To identify suitable materials for a task.	• Some materials are more suitable for certain jobs than others. • Waterproof materials are useful for keeping things dry. • Strong materials are useful for building objects. • Flexible materials can bend without breaking. • Ruth Benerito developed stronger and more useful fabrics used in everyday life.	Choosing suitable materials. Explaining reasons for choices. **Comparing** materials for different purposes. Testing materials for suitability.	• **Asking** scientific questions about suitable materials. • Making simple **predictions**. • Planning and carrying out simple comparative **investigations**. • **Observing** and measuring how materials behave. • **Recording** findings using tables and labelled diagrams. • Explaining choices **using evidence**	
To understand materials can change their shape.	• Some materials can change shape when forces are applied. • Materials can be bent, twisted, stretched or squashed. • Some materials return to their original shape while others do not. • Different materials respond differently to forces.	Manipulating materials safely. **Observing** changes in shape. Describing changes using scientific vocabulary. **Comparing** how materials respond to forces.	• **Asking** scientific questions about forces and materials. • **Observing** how materials change shape when forces are applied. • **Comparing** how different materials respond. • **Recording** findings using charts and diagrams.	

			• **Identifying patterns** in how materials behave.	
To explore and test the stretchiness of materials.	• Some materials are stretchy while others are rigid. • Stretchy materials can change length when pulled. • Different materials stretch by different amounts. • Stretchy materials are useful for certain purposes.	Testing materials fairly. Measuring and **comparing** stretchiness. **Recording** results. Making **predictions**.	• **Asking** scientific questions about stretchiness. • Making **predictions** about materials. • Planning and carrying out comparative **investigations**. • Measuring and **comparing** how materials stretch. • **Recording** findings using tables and charts. • **Interpreting results** to identify **patterns**.	
To recognise that the strength of some materials can be changed.	• Some materials become stronger when they are folded, layered or twisted. • The shape of a material can affect its strength. • Strong materials are important for building and making objects. • Scientists and engineers test materials before using them.	Testing the strength of materials. **Comparing** strong and weak materials. **Recording** observations. Explaining results using scientific vocabulary.	• **Asking** scientific questions about material strength. • Testing materials using **simple investigations**. • **Observing** and **comparing** results carefully. • **Recording** findings using tables and charts. • Explaining how shape affects strength **using evidence**.	
To identify how plastic can harm the environment and explore materials that are better for the planet.	• Some plastics take a very long time to break down. • Plastic pollution can harm animals and habitats. • Some materials can be recycled or reused. • Environmentally friendly materials can help protect the planet.	Identifying materials that can be reused or recycled. **Comparing** materials and their environmental impact. Discussing ways to reduce plastic waste. Explaining choices using scientific vocabulary.	• **Asking** scientific questions about materials and the environment. • **Observing** and **comparing** different materials. • **Researching** using secondary sources. • **Recording** findings using tables and posters. • **Interpreting evidence** about recycling and environmental impact.	

Year Two- Title of Unit: STEAM project

National Curriculum Links
• identify and compare the suitability of a variety of everyday materials for particular uses • find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching • ask simple questions and recognise that they can be answered in different ways • observe closely, using simple equipment • perform simple comparative tests • identify and classify • use observations and ideas to suggest answers to questions • gather and record data to help in answering questions • understand the significance of Isambard Kingdom Brunel and his impact on bridges and transport

Prior Learning:	Future Learning:
Year 1: • Exploration of strong and weak materials • Building simple structures and shelters • Understanding that materials have different properties • Using simple tests to compare materials • Designing and making models through play and DT activities • Talking about weather, structures and simple engineering ideas	**Year 3** • Explore forces such as pushes and pulls acting on structures • Investigate how structures are strengthened through shape and support • Develop fair testing and recording methods in scientific enquiries **Year 4** • Investigate how bridges and structures are affected by forces • Explore engineering and design in greater detail • Evaluate and improve products through repeated testing **Year 5/6** • Investigate complex structures, mechanisms and engineering solutions • Use scientific evidence to justify design choices • Understand how engineering can solve real-world problems

Possible misconceptions	Assessment opportunities:
• Bigger bridges are always stronger • Thick materials are always the strongest • Flat shapes are just as strong as supported shapes • Bridges do not need supports underneath • If a bridge stands up, it is automatically successful • Engineers build without planning or testing • Tape alone makes structures strong • One test gives a completely fair result	• Identifies and compares different bridge types • Explains why bridges are important • Describes properties of materials using scientific vocabulary • Investigates which shapes make structures stronger • Designs a bridge for a purpose and explains choices • Builds a stable structure using suitable materials • Tests and evaluates a bridge fairly • Records results and observations clearly • Suggests improvements using evidence from testing • Works collaboratively to solve problems and improve designs

STEAM project				
Enquiry Question: Can we design and build a strong bridge like Isambard Kingdom Brunel?				
Lesson objectives	**Knowledge**	**Skills**	**Working Scientifically**	**Vocabulary**
To understand why bridges are important and explore different types of bridges	• Bridges help people cross gaps safely • Different bridges have different purposes • Brunel designed famous bridges	• Observing structures • Comparing bridge types • Discussing ideas	• Asking simple questions • Identifying and classifying	• bridge • structure • engineer • architect • stable • strong • weak • support • design • test • evaluate • improve • truss • arch • suspension • beam • force • weight • balance
To investigate which shapes and materials make bridges strong	• Some shapes are stronger than others • Triangles can strengthen structures • Materials have different strengths	• Testing materials • Building structures • Comparing results	• Performing simple tests • Observing closely- Using observations to answer questions	
To design a strong bridge using suitable materials and shapes	• Engineers plan before building • Designs should solve problem • Strong structures need support	• Designing • Labelling plans • Explaining choices	• Using observations and ideas to suggest answers	
To build a bridge using a design plan	• Structures must be stable and balanced • Joining methods affect strength	• Constructing • Measuring • Joining materials	• Observing closely • Performing comparative tests	
To test and evaluate the strength of a bridge	• Bridges can be tested for strength and stability • Engineers improve designs after testing	• Testing • Recording result • Evaluating effectiveness	• Gathering and recording data • Using evidence to answer questions	
To improve and present a bridge design	• Designs can be adapted and improved • Engineers explain and share solutions	• Redesigning • Problem solving • Presenting ideas	• Using observations and evidence to suggest improvements	

Year Three - Plants

National Curriculum Statements:
• 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:
Year 2: • 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	**Year 5:** • Describe the life process of reproduction in some plants and animals. **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.

Possible misconceptions	Assessment opportunities:
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	• **Observation activities** – Children observe flowering plants closely and identify the functions of different plant parts • **Investigation activities** – Children investigate what plants need to grow and how water is transported through plants • **Sequencing activities** – Children sequence the stages of pollination and seed dispersal • **Comparison activities** – Children compare different methods of seed dispersal and plant adaptations • **Discussion activities** – Children explain how different parts of a plant help it survive and reproduce • **Drawing and labelling** – Children draw and label parts of a flowering plant accurate

Plants				
Enquiry Question: How do different parts of a plant help it to survive and reproduce?				
Lesson objectives	**Knowledge**	**Skills**	**Working Scientifically**	**Vocabulary**
To understand the basic needs of a plant for life	• Plants need water, light, air, nutrients and space to grow. • Different plants may need different amounts of water and light.	**Observing** plant growth carefully. **Comparing** healthy and unhealthy plants.	• **Asking** relevant scientific questions about plant growth. • Making **predictions** about what plants need to survive.	nutrients pollination pollen seed dispersal

	• Without these requirements, plants may not survive. • Healthy plants show signs of good growth. • Jan Ingenhousz discovered that plants need light to stay healthy and grow.	Making **predictions** about plant growth. Recording observations over time.	• **Observing** plant growth carefully over time. • Measuring changes in plant growth using simple equipment. • Recording findings using tables, diagrams and plant diaries. • **Interpreting results** to identify **patterns** in healthy plant growth.	reproduction fertilisation absorb transport stem roots flower photosynthesis oxygen carbon dioxide water dispersal wind dispersal insect pollination
To identify and describe the functions of different parts of a flowering plant	• Roots absorb water and nutrients from the soil. • The stem transports water and supports the plant. • Leaves make food for the plant. • Flowers help plants reproduce. • Different parts of plants have different jobs.	Identifying plant parts. Labelling diagrams accurately. Explaining the function of each part. **Comparing** plant structures.	• **Asking** scientific questions about plant structures. • **Observing** flowering plants closely using magnifiers and diagrams. • **Comparing** the functions of different plant parts. • Recording findings using labelled scientific diagrams. • Explaining how plant parts help plants survive.	
To understand how water is transported in plants	• Water travels through the stem to different parts of the plant. • Roots absorb water from the soil. • Water is important for plant survival and growth. • The stem acts like a transport system.	**Observing** how coloured water moves through plants. Making **predictions**. Recording observations. Explaining results using scientific vocabulary.	• **Asking** scientific questions about water transport. • Planning and carrying out a **simple investigation** using coloured water. • **Observing** changes carefully over time. • Recording findings using diagrams and tables. • **Interpreting results** to explain how water moves through plants.	
To explore the part that flowers play in the life cycle of flowering plants	• Flowers are part of a plant's reproductive system. • Flowers produce seeds. • Seeds can grow into new plants. • Pollination helps plants reproduce.	Identifying parts of flowers. **Observing** flowers closely. Sequencing stages in a plant life cycle. Explaining how flowers help reproduction.	• **Asking** scientific questions about plant reproduction. • **Observing** flowers closely using magnifiers and diagrams. • Identifying and **comparing** flower parts. • Recording findings using labelled diagrams. • Explaining how flowers help plants reproduce.	
To understand the pollination process	• Pollination happens when pollen moves from one flower to another.	**Observing** pollination diagrams and models.	• **Asking** scientific questions about pollination.	

	• Pollination can happen through insects or wind. • Bees and other insects help plants reproduce. • Pollination helps seeds form.	Sequencing the pollination process. Explaining how insects help plants. Using scientific vocabulary accurately.	• **Observing** pollination processes using models and secondary sources. • Sequencing the stages of pollination. • **Recording** findings using flow diagrams and scientific vocabulary. • **Interpreting evidence** to explain how pollination supports reproduction.	
To understand the ways in which seeds are dispersed	• Seeds are dispersed in different ways. • Seeds can be spread by wind, water, animals or explosion. • Seed dispersal helps plants grow in new places. • Different seeds are adapted for different methods of dispersal.	**Comparing** different seeds. Identifying seed dispersal methods. **Observing** adaptations closely. Explaining how seed shape helps dispersal.	• **Asking** scientific questions about seed dispersal. • **Observing** and **comparing** different seeds closely. • Identifying how seeds are adapted for dispersal. • **Recording** findings using classification charts and labelled diagrams. • **Interpreting patterns** between seed structure and dispersal method.	

Year Three – Animals Including Humans

National Curriculum Statements:
• 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:
Year 1: • 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 **Year 2:** • 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.	**Year 4:** • 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 **Year 6:** • Recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function

Possible misconceptions	Assessment opportunities:
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.	• **Sorting activities** – Children sort foods into food groups and identify the nutrients they provide • **Classification activities** – Children classify animals by skeleton type (endoskeleton, exoskeleton and hydrostatic skeleton) • **Observation activities** – Children observe how muscles and joints help the body move • **Investigation activities** – Children investigate how muscles work during movement and exercise • **Discussion activities** – Children explain how nutrition, skeletons and muscles help animals survive • **Drawing and labelling** – Children draw and label the human skeleton accurately

Animals Including Humans
Enquiry Question: How do animals (including humans) get the nutrients they need and how do they move?

Lesson objectives	Knowledge	Skills	Working Scientifically	Vocabulary
To understand what nutrition is and why it is important	• Nutrition is the process of getting the food needed for growth and energy. • Animals, including humans, need nutrition to survive. • Humans cannot make their own food. • Different foods provide different nutrients.	Identifying foods that provide nutrition. **Explaining why** nutrition is important. **Comparing** healthy and unhealthy diets. Using scientific vocabulary accurately.	• **Asking** relevant scientific questions about nutrition and health. • **Observing** and **comparing** different foods and diets. • **Sorting** foods into nutritional categories. • **Recording** findings using tables and charts. • **Interpreting results** to explain why nutrition is important.	nutrition nutrients carbohydrates protein dairy vitamins minerals balanced diet skeleton endoskeleton exoskeleton hydrostatic skeleton muscles joints movement support protection
To explore the five key food groups and the nutrients they provide	• The main food groups are carbohydrates, protein, dairy, fruits and vegetables, and oils/spreads. • Carbohydrates provide energy. • Protein helps growth and repair. • Fruits and vegetables provide vitamins and minerals. • A balanced diet includes foods from all food groups.	**Sorting** foods into food groups. **Comparing** meals and diets. Designing balanced meals. Explaining food choices using scientific vocabulary.	• **Asking** scientific questions about food groups and nutrients. • **Observing** and classifying foods carefully. • **Comparing** balanced and unbalanced meals. • **Recording** findings using food charts and tables. • Explaining how nutrients help the body function.	
To learn the different types of skeletons	• Animals have different types of skeletons. • An endoskeleton is inside the body. • An exoskeleton is outside the body. • Some animals have hydrostatic skeletons supported by fluid. • Skeletons help animals move and survive.	Identifying different skeleton types. **Comparing** animal body structures. Grouping animals by skeleton type. Explaining **similarities and differences**.	• **Asking** scientific questions about animal skeletons. • **Observing** and **comparing** animal body structures. • **Sorting** animals according to skeleton type. • **Recording** findings using classification charts. • **Identifying patterns** in animal skeletons.	
To learn about the human skeleton	• Humans have an internal skeleton called an endoskeleton. • The skeleton supports the body and protects organs. • Major bones include the skull, ribs, spine, pelvis, femur and humerus. • The skeleton works with muscles to help movement.	Identifying major bones. Labelling skeleton diagrams. **Comparing** bone sizes and shapes. Explaining the functions of the skeleton.	• **Asking** scientific questions about the human skeleton. • **Observing** skeleton models and diagrams closely. • Identifying and labelling major bones. • **Recording** findings using labelled scientific diagrams. • Explaining how the skeleton supports and protects the body.	
To learn about animals and their skeletons	• Different animals have different skeletons. • Skeletons are adapted to how animals move and survive. • Some animals have no bones.	**Comparing** animal skeletons. Grouping animals by skeleton type. **Observing similarities and differences**. Explaining adaptations.	• **Asking** scientific questions about how skeletons help animals survive. • **Observing** and **comparing** animal skeletons.	

	• Skeletons protect important body parts.		• **Sorting and grouping** animals by skeleton type. • **Recording** findings using tables and diagrams. • **Interpreting similarities and differences** between skeletons.	
To explore the role of muscles	• Muscles help the body move. • Muscles work by contracting and relaxing. • Muscles work together with bones. • Humans use muscles for movement, posture and strength. • The heart is a muscle • Daniel Hale Williams performed important heart surgery and helped improve healthcare.	**Observing** muscles during movement. Identifying muscles used in activities. **Comparing** movements. **Recording** observations.	• **Asking** scientific questions about movement and muscles. • **Observing** muscles during physical activity. • Planning and carrying out **simple investigations** into movement. • Measuring and **Recording** observations carefully. • **Interpreting results** to explain how muscles work with the skeleton.	

Year Three - Rocks

National Curriculum Statements:
• 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:
• **Year 1:** • 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. **Year 2:** • Identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses	• **Year 6:** • Recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago **KS3:** • The composition of the Earth. • The structure of the Earth. • The rock cycle and the formation of igneous, sedimentary and metamorphic rocks

Possible misconceptions	Assessment opportunities:
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	• **Observation activities** – Children observe and compare the properties of different rocks and soils • **Classification activities** – Children group rocks based on their appearance and physical properties • **Investigation activities** – Children investigate permeability, durability and weathering of rocks • **Comparison activities** – Children compare igneous, sedimentary and metamorphic rocks • **Discussion activities** – Children explain how rocks change and why different rocks are useful • **Drawing and labelling** – Children draw and label rock types, fossils or soil layers accurately

Rocks
Enquiry Question: How do rocks change and how are they useful?

Lesson objectives	Knowledge	Skills	Working Scientifically	Vocabulary
To investigate rocks properties	• Rocks have different appearances and properties. • Rocks can be hard, soft, rough, smooth, permeable or impermeable. • Different rocks are used for different purposes. • Rocks are naturally occurring materials.	**Observing** rocks closely. **Comparing** rock properties. Grouping rocks by their features. **Recording** observations using scientific vocabulary.	• **Asking** relevant scientific questions about rocks and their properties. • **Observing** rocks closely using magnifiers and simple equipment. • **Comparing** rocks based on appearance and physical properties. • **Sorting and grouping** rocks using chosen criteria. • **Recording** findings using tables and classification charts. • **Interpreting patterns** in rock properties.	rock igneous sedimentary metamorphic fossil soil organic matter weathering erosion permeable impermeable durable magma lava crystals sediment
To explore the formation and properties of igneous rocks	• Igneous rocks are formed when magma or lava cools and hardens. • Igneous rocks are usually hard and durable. • Granite and basalt are examples of igneous rocks. • Some igneous rocks contain crystals.	Identifying igneous rocks. **Observing** textures and crystals. **Comparing** different rock types. Explaining how igneous rocks form.	• **Asking** scientific questions about rock hardness, texture and permeability. • Making **predictions** about rock properties. • Planning and carrying out simple comparative **investigations**. • **Observing** and measuring results carefully. • **Recording** findings using tables and charts. • **Interpreting results** to compare different rocks.	
To explore the formation and properties of sedimentary rocks	• Sedimentary rocks are formed from layers of sediment pressed together over time. • Fossils are often found in sedimentary rocks. • Sandstone and chalk are examples of sedimentary rocks. • Sedimentary rocks may be softer and more crumbly.	**Observing** layers in rocks. **Comparing** sedimentary rocks with other rocks. Identifying simple features of sedimentary rocks. Explaining how sedimentary rocks form.	• **Asking** scientific questions about rock hardness, texture and permeability. • Making **predictions** about rock properties. • Planning and carrying out simple comparative **investigations**. • **Observing** and measuring results carefully. • **Recording** findings using tables and charts. • **Interpreting results** to compare different rocks.	
To explore the formation and properties of metamorphic rocks	• Metamorphic rocks form when existing rocks are changed by heat and pressure. • Marble and slate are examples of metamorphic rocks. • Metamorphic rocks are often very hard. • Heat and pressure can change a rock's appearance and properties.	**Comparing** metamorphic rocks with other rocks. **Observing patterns** and textures. Explaining how metamorphic rocks form. **Identifying similarities and differences**.	• **Asking** scientific questions about rock hardness, texture and permeability. • Making **predictions** about rock properties. • Planning and carrying out simple comparative **investigations**. • **Observing** and measuring results carefully. • **Recording** findings using tables and charts. • **Interpreting results** to compare different rocks.	

To understand weathering and the effect it has on rocks	• Weathering is the breaking down of rocks over time. • Wind, rain, ice and temperature changes can weather rocks. • Weathering changes the shape and size of rocks. • Weathering happens slowly over long periods of time.	**Observing** signs of weathering. **Comparing** weathered and un weathered rocks. **Recording** changes. Explaining how weather affects rocks.	• **Asking** scientific questions about how rocks change over time. • **Observing** examples of weathered rocks carefully. • **Comparing** weathered and unweathered rocks. • **Recording** findings using labelled diagrams and comparison tables. • **Interpreting evidence** to explain how weathering changes rocks.	
To explore how water contributes to the weathering of rocks	• Water can break down rocks over time. • Water enters cracks in rocks and can freeze and expand. • Rivers and waves can wear rocks away. • Water weathering changes landscapes.	**Observing** the effects of water on rocks. Performing simple erosion **investigations**. **Recording** observations. Explaining changes using scientific vocabulary.	• **Asking scientific questions** about the effect of water on rocks. • Making **predictions** before **investigations**. • Planning and carrying out simple comparative **investigations**. • **Observing** and measuring changes to rocks over time. • **Recording** findings using tables and diagrams. • **Interpreting results** to explain how water causes weathering	
To explore the suitability of rocks for different purposes	• Different rocks are suitable for different jobs. • Hard rocks are useful for building. • Some rocks are waterproof or durable. • Properties determine how rocks are used.	**Comparing** rock properties. Matching rocks to uses. Explaining choices **using evidence**. Testing rock suitability.	• **Asking** scientific questions about how rocks are used. • **Observing** and **comparing** rock properties carefully. • Planning and carrying out comparative **investigations** on rocks. • **Recording** findings using tables and charts. • **Interpreting evidence** to explain why certain rocks are suitable for particular purposes.	
To understand how fossils form	• Fossils are formed when plants or animals become trapped in sediment. • Over time, layers build up and the remains become fossils. • Fossils provide evidence of life from millions of years ago. • Fossils are usually found in sedimentary rock.	Sequencing fossil formation. **Observing** fossil **patterns** and shapes. **Comparing** fossils. Explaining the fossilisation process.	• **Asking** scientific questions about fossils and extinct organisms. • **Observing** fossil examples and images carefully. • **Comparing** fossils with living organisms. • **Recording** findings using labelled diagrams and sequencing charts. • **Interpreting evidence** to explain fossil formation.	

	• Mary Anning discovered fossils that helped scientists learn about prehistoric life.			
To create a fossil	• Fossils can leave imprints or traces. • Fossils help scientists learn about prehistoric life. • Fossils form over very long periods of time. • Fossil shapes preserve evidence of living things.	Creating fossil imprints. **Observing** **patterns** and details. **Recording** findings. **Comparing** fossil shapes.	• **Asking** scientific questions about how fossils form. • **Observing** fossil examples and **Identifying patterns**. • Using models to recreate the fossilisation process. • **Recording** findings using labelled diagrams and sequencing charts. • Explaining how fossils provide evidence about the past.	
To understand what soil	• Soil is made from broken rock and organic matter. • Soil contains nutrients for plants. • Different soils have different properties. • Soil supports plant growth.	**Observing** soil closely. Identifying components of soil. **Comparing** different soils. Using scientific vocabulary accurately.	• **Asking** scientific questions about soil composition. • **Observing** soil samples carefully using magnifiers. • **Comparing** different types of soil. • **Recording** findings using tables and labelled diagrams. • **Interpreting evidence** to explain that soil is made from rocks and organic matter.	
To explore different type of soil	• Common soil types include sandy, clay and chalky soil. • Different soils hold water differently. • Some soils are better for growing plants. • Soil properties affect how land is used.	Testing soil properties. **Comparing** soil types. **Recording** results. Explaining findings.	• **Asking** scientific questions about soil. • **Observing** and **comparing** soil samples closely. • **Identifying similarities and differences** between soils. • **Recording** findings using tables and labelled diagrams. • **Interpreting results** to explain how soils are different.	

Year Three – Light

National Curriculum Statements:
• 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:
EYFS: • Explore how things work. • Talk about the differences in materials and changes they notice. • Describe what they see, hear and feel whilst outside **Year 1:** • Identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense. • Describe the simple physical properties of a variety of everyday materials	**Year 6:** • 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.

Possible misconceptions	Assessment opportunities:
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	• **Sorting activities** – Children sort objects into light sources and non-light sources • **Investigation activities** – Children investigate reflective materials and how shadows are formed • **Observation activities** – Children observe how shadows change throughout the day • **Comparison activities** – Children compare materials based on how reflective they are • **Discussion activities** – Children explain how light helps us see and create shadows • **Drawing and labelling** – Children draw and label shadow **investigations** and reflective objects accurately

Light				
Enquiry Question: How does light help us see and create shadows?				
Lesson objectives	**Knowledge**	**Skills**	**Working Scientifically**	**Vocabulary**
To understand where light comes from and that light is needed to see	• Light comes from light sources. • We need light to see things. • Darkness is the absence of light.	Identifying light sources. **Observing** how light helps us see. **Comparing** light and dark environments.	• **Asking** relevant scientific questions about light and visibility. • **Observing** how objects are seen in light and darkness.	light source reflection reflective opaque

	• Some light sources are natural and some are artificial. • Ibn al-Haytham investigated light and explained how humans see objects.	Explaining observations using scientific vocabulary.	• **Comparing** environments with different amounts of light. • **Recording** findings using tables and labelled diagrams. • **Interpreting results** to explain why light is needed to see.	transparent shadow absorb sunlight artificial light natural light block beam
To identify the difference between light sources and non light sources	• A light source produces its own light. • Non-light sources do not make their own light. • Some objects reflect light but are not light sources. • The Sun is a natural light source.	**Sorting** objects into light and non-light sources. **Observing** reflective objects. **Explaining why** some objects are not light sources. **Recording** findings.	• **Asking** scientific questions about objects that produce light. • **Observing** and classifying different objects carefully. • **Sorting** objects into light sources and non-light sources. • **Recording** findings using classification charts and tables. • Explaining how some objects emit light while others reflect it	
To explore materials which are reflective	• Light reflects from surfaces. • Smooth and shiny surfaces reflect more light. • Mirrors are highly reflective. • Reflection helps us see objects.	Testing reflective materials. **Comparing** reflective and non-reflective surfaces. **Observing** how light changes on different surfaces. **Recording** observations.	• **Asking** scientific questions about reflective materials. • **Observing** how light behaves on different surfaces. • **Comparing** reflective and non-reflective materials. • **Recording** findings using charts and labelled diagrams. • **Interpreting evidence** to identify which materials reflect light best.	
To discover how shadows are formed	• Shadows are formed when light is blocked by an opaque object. • Shadows appear on the side opposite the light source. • Transparent objects create little or no shadow. • Opaque objects create dark shadows.	Investigating shadow formation. **Observing** how objects block light. **Comparing** shadows created by different materials. Explaining observations using scientific vocabulary.	• **Asking** scientific questions about shadow formation. • Making **predictions** before **investigations**. • Planning and carrying out **simple investigations** using light sources and objects. • **Observing** shadows carefully. • **Recording** findings using labelled diagrams and tables. • **Interpreting results** to explain how shadows are formed.	

To investigate how shadows change throughout the day	• The position of the Sun changes throughout the day. • Shadows change length and direction during the day. • Shadows are longer when the Sun is lower in the sky. • **Patterns** can be observed in shadow changes.	Measuring shadows. **Recording** shadow changes over time. **Comparing** results. **Identifying patterns**.	• **Asking** scientific questions about how shadows change. • **Observing** shadows over time carefully. • Measuring shadow length and direction accurately. • **Recording** findings using tables, charts and diagrams. • **Identifying patterns** in how shadows change during the day.	
To investigate how you can change the size of a shadow	• Shadow size changes depending on the position of the light source. • Moving an object closer to the light source makes the shadow larger. • Moving an object further away makes the shadow smaller. • Light travels in straight lines.	Investigating shadow size changes. Measuring and **comparing** shadows. Making **predictions**. **Recording** results accurately.	• **Asking** scientific questions about shadow size. • Making **predictions** before **investigations**. • Planning and carrying out comparative **investigations** using light sources and objects. • **Observing** and measuring shadow size carefully. • **Recording** findings using tables and diagrams. • **Interpreting results** to explain how shadow size changes.	

Year Three – Forces and Magnets

National Curriculum Statements:
• Compare how things move on different surfaces. • Notice that some forces need contact between two objects, but magnetic forces can act at a distance. • Observe how magnets attract or repel each other and attract some materials and not others. • Compare and group together a variety of everyday materials on the basis of whether they are attracted to a magnet, and identify some magnetic materials. • Describe magnets as having two poles. • Predict whether two magnets will attract or repel each other, depending on which poles are facing.

Prior Learning:	Future Learning:
EYFS • Explore how things work. • Explore and talk about different forces they can feel. • Talk about the differences between materials and changes they notice. • Explore the natural world around them. • Describe what they see, hear and feel whilst outside. **Year 2:** • Find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching.	**Year 5:** • 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. **KS3** • Magnetic fields by plotting with compass, representation by field lines. • Earth's magnetism, compass and navigation.

Possible misconceptions	Assessment opportunities:
Some children may think: • the bigger the magnet the stronger it is • all metals are magnetic.	• **Investigation activities** – Children investigate how objects move on different surfaces and how magnets work • **Classification activities** – Children sort materials into magnetic and non-magnetic groups • **Observation activities** – Children observe how magnets attract and repel • **Comparison activities** – Children compare the strength of different magnets • **Discussion activities** – Children explain how forces and magnets affect movement • **Recording activities** – Children record findings using tables, charts and labelled diagrams

Forces and Magnets				
Enquiry Question: How do forces and magnets affect movement?				
Lesson objectives	**Knowledge**	**Skills**	**Working Scientifically**	**Vocabulary**
To understand what a force is	• A force is a push or a pull. • Some forces require contact between objects.	Identifying pushes and pulls. **Observing** how forces affect movement. **Comparing** contact and non-contact forces.	• **Asking** relevant scientific questions about pushes and pulls.	force push pull

	• Magnetic forces can act without touching. • Forces can make objects move, stop or change direction.	Explaining observations using scientific vocabulary.	• **Observing** how objects move in different ways. • **Comparing** movements caused by different forces. • **Recording** findings using tables and labelled diagrams. • **Interpreting observations** to explain how forces affect movement.	friction magnetic magnet poles attract repel magnetic field north pole south pole surface resistance
To investigate how things move on different surfaces	• Surfaces affect how objects move. • Rough surfaces create more friction. • Smooth surfaces create less friction. • Friction slows objects down.	Testing movement on different surfaces. Measuring and **comparing** distances. **Recording** observations. **Identifying patterns** in results.	• **Asking** scientific questions about friction and movement. • Making **predictions** before **investigations**. • Planning and carrying out comparative **investigations** using different surfaces. • **Observing** and measuring how objects move across surfaces. • **Recording** findings using tables and charts. • **Interpreting results** to identify **patterns** between surfaces and movement.	
To explore different types of magnets and how they work	• Magnets produce a magnetic force. • Magnets can attract or repel. • Magnets have two poles: north and south. • Different magnets have different shapes and strengths.	Identifying different magnets. **Observing** magnetic behaviour. **Comparing** magnet strength. Using scientific vocabulary accurately.	• **Asking** scientific questions about magnets and materials. • **Observing** how different materials respond to magnets. • **Sorting and grouping** materials into magnetic and non-magnetic categories. • **Recording** findings using classification tables and charts. • **Interpreting evidence** to identify **patterns** in magnetic materials.	
To explore everyday objects that are magnetic	• Some materials are magnetic and some are not. • Iron, nickel and steel are magnetic materials. • Not all metals are magnetic. • Magnets attract certain materials.	Testing objects for magnetism. **Sorting** magnetic and non-magnetic materials. **Recording** findings. Explaining results.	• **Asking** scientific questions about magnetic forces. • Making **predictions** about magnet interactions. • **Observing** magnets carefully during **investigations**. • **Recording** findings using diagrams and tables. • **Interpreting results** to explain attraction and repulsion.	

To explore everyday uses of magnets	• Magnets are used in many everyday objects. • Magnets are found in fridge doors, toys, speakers and compasses. • Magnets can help hold, close or move objects. • Different magnets are used for different purposes.	Identifying uses of magnets. **Comparing** objects that use magnets. **Explaining why** magnets are useful. **Recording** observations.	• **Asking** scientific questions about how magnets are used. • **Observing** magnets in real-life objects and devices. • **Comparing** different uses of magnets. • **Recording** findings using tables, diagrams and notes. • Explaining how magnetic forces are useful in everyday life.	
To understand that magnetic forces can act at a distance	• Magnetic forces can work without touching. • Magnets can pull magnetic materials through some objects. • Opposite poles attract and like poles repel. • Magnetic force becomes weaker over greater distances.	Investigating magnetic attraction and repulsion. **Observing** magnetic forces at different distances. Measuring distances during **investigations**. **Recording** and explaining results.	• **Asking** scientific questions about magnetic poles. • **Observing** how poles interact during **investigations**. • **Comparing** north and south pole interactions. • **Recording** findings using labelled diagrams and charts. • **Interpreting patterns** between poles and magnetic behaviour	

Year Three – STEAM project

National Curriculum Statements:
• compare how things move on different surfaces • notice that some forces need contact between two objects, but magnetic forces can act at a distance • 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 • ask relevant questions and use different types of scientific enquiries to answer them • set up simple practical enquiries, comparative and fair tests • make careful observations and take accurate measurements using standard units • gather, record, classify and present data in a variety of ways • report on findings from enquiries, including oral and written explanations and displays of results • use results to draw simple conclusions, make predictions for new values and suggest improvements

Prior Learning:	Future Learning:
Year 1: • Exploration of strong and weak materials and weather-proof shelters **Year 2:** • Investigation of stable bridge structures and suitable materials • Understanding that structures need support and stability • Experience of testing, evaluating and improving designs • Knowledge of pushes and pulls from KS1 science • Using simple comparative tests and recording observations	**Year 4** • Investigate how different forces affect movement including air resistance and water resistance • Explore how structures and materials are adapted for different environments • Develop more accurate fair testing and data recording skills **Year 5** • Investigate gravity and its effect on objects • Explore mechanisms and engineering solutions in DT projects • Use evidence to justify scientific conclusions **Year 6** • Plan and carry out increasingly complex comparative and fair tests independently • Evaluate and refine designs using scientific evidence • Understand how engineering solves real-world environmental and structural challenges

Possible misconceptions	Assessment opportunities:
• Strong materials always make stable structures • Heavy structures are always stronger than light structures • Earthquakes only damage weak buildings • The tallest structure is the best structure • Forces only happen when objects move • All rocks are equally strong and durable • If a structure survives one test, it will always survive • Stability and balance mean the same thing	• Explains how earthquakes affect structures • Identifies forces acting on a structure during testing • Compares the stability of different structures and shapes • Uses scientific vocabulary accurately when discussing materials and forces • Sets up and carries out comparative tests • Records observations and results clearly • Draws conclusions from evidence collected during testing • Designs a structure for a specific purpose using labelled plans

	• Builds and adapts a structure using suitable materials • Evaluates and improves a design after testing • Works collaboratively to solve engineering problems

STEAM Project				
Enquiry Question: Which structure is the most stable during an earthquake?				
Lesson objectives	**Knowledge**	**Skills**	**Working Scientifically**	**Vocabulary**
To understand how earthquakes affect buildings and structures	• Earthquakes cause the ground to shake and create forces on structures	Observing, discussing, identifying problems	• Asking questions • Using observations	• force • friction • stability • structure • foundation • support • earthquake • vibration • collapse • engineer • design • evaluate • improve • compress • resist
To investigate which shapes and foundations make structures stable	• Some shapes and bases create more stable structures	Testing, comparing, measuring	• Comparative testing	
To investigate how different materials respond to forces	• Materials react differently to pushes, pulls and movement	Testing materials, recording observations	• Observing closely • Gathering data	
To design an earthquake-proof structure	• Engineers design structures to solve problems	Designing, planning, labelling	• Using evidence to support ideas	
To build a stable structure using selected materials	• Structures need strong supports and stable foundations	Constructing, measuring, assembling	• Testing and observing	
To test, evaluate and improve a structure	• To test, evaluate and improve a structure	To test, evaluate and improve a structure	• To test, evaluate and improve a structure	

Year Four – Living Things and their Habitats

National Curriculum Statements:
• 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:
Year 1: • Identify and name a variety of common wild and garden plants, including deciduous and evergreen trees. • Identify and describe the basic structure of a variety of common flowering plants, including trees. • Identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals. • Describe and compare the structure of a variety of common animals (fish, amphibians, reptiles, birds and mammals, including pets). **Year 2:** • Identify and name a variety of plants and animals in their habitats, including microhabitats	• **Year 5:** • 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 **Year 6:** • Describe how living things are classified into broad groups according to common observable characteristics and based on **similarities and differences**, including microorganisms, plants and animals. • Give reasons for classifying plants and animals based on specific characteristics

Possible misconceptions	Assessment opportunities:
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.	• **Classification activities** – Children classify living things using observable characteristics • **Sorting activities** – Children sort animals into vertebrate and invertebrate groups and plants into flowering and non-flowering groups • **Observation activities** – Children observe **similarities and differences** between living things in the local environment • **Investigation activities** – Children use and create classification keys to identify organisms • **Discussion activities** – Children explain how adaptations help living things survive in their environments • **Recording activities** – Children record findings using classification charts, branching databases and labelled diagrams

Living Things and their Habitats				
Enquiry Question: How can we group and classify living things?				
Lesson objectives	**Knowledge**	**Skills**	**Working Scientifically**	**Vocabulary**

To understand what classification is and why it is useful	• Classification means grouping living things based on **similarities and differences**. • Scientists classify living things to help identify and study them. • Living things can be grouped in different ways. • Classification helps us understand relationships between organisms. • Carl Linnaeus created a system for naming and classifying living things.	**Sorting** living things into groups. **Observing similarities and differences**. Explaining reasons for classifications. Using scientific vocabulary accurately.	• **Asking** scientific questions about how living things are grouped. • **Observing similarities and differences** between organisms carefully. • **Sorting and grouping** living things using observable characteristics. • **Recording** findings using tables and **sorting** charts. • **Explaining why** classification is useful in science.	classification classify vertebrate invertebrate flowering plant non-flowering plant classification key characteristics environment adaptation species criteria organism
To explore how animals can be classified (vertebrates and invertebrates)	• Vertebrates have a backbone. • Invertebrates do not have a backbone. • Vertebrates can be grouped into mammals, birds, reptiles, amphibians and fish. • Invertebrates include insects, arachnids and molluscs	Identifying vertebrates and invertebrates. Grouping animals accurately. **Comparing** animal features. Explaining classifications **using evidence**.	• **Asking** scientific questions about animal groups. • **Observing** animal features carefully using pictures, videos and models. • **Sorting and grouping** animals into vertebrates and invertebrates. • **Recording** findings using classification charts and diagrams. • **Interpreting evidence** to explain classifications.	
To understand how plants can be classified (flowering and non-flowering)	• Some plants produce flowers and some do not. • Flowering plants reproduce using flowers and seeds. • Non-flowering plants reproduce in different ways, such as spores. • Plants can be classified by their features.	**Observing** plant characteristics. **Sorting** flowering and non-flowering plants. **Comparing** plant structures. **Recording** findings accurately	• **Asking** scientific questions about plant groups. • **Observing** plant features carefully using real plants and images. • **Comparing** flowering and non-flowering plants. • **Recording** findings using tables and labelled diagrams. • **Identifying patterns** between plant features and classifications.	
To explore classification keys	• Classification keys help identify living things. • Keys use yes/no questions based on observable features. • Scientists use keys to organise information. • Classification keys help identify unknown organisms.	Using simple classification keys. **Observing** features carefully. Answering questions accurately. Identifying organisms **using evidence**.	• **Asking** scientific questions about identifying organisms. • **Observing** characteristics carefully to answer classification questions. • **Recording** findings using branching diagrams and tables. • **Interpreting evidence** to identify living things correctly.	
To create classification keys	• Classification keys must use clear observable features. • Questions in keys should narrow down choices.	Designing simple classification keys. Choosing suitable classification questions.	• **Asking** scientific questions about how to identify organisms. • **Observing similarities and differences** between living things.	

	• Different living things can be identified through classification systems. • Scientists create keys to organise organisms.	Grouping living things accurately. Explaining decisions clearly.	• Planning and creating simple classification keys. • **Recording** findings using branching diagrams and charts. • **Evaluating** how effective the classification key is.	
To explore adaptations and classification within species	• Living things have adaptations that help them survive. • Animals and plants within the same group can still have differences. • Adaptations may relate to habitat, diet or survival. • Classification helps identify **similarities and differences**.	**Comparing** organisms within groups. **Observing** adaptations closely. Explaining how adaptations help survival. **Recording similarities and differences**.	• **Asking** scientific questions about adaptation and survival. • **Observing** features of organisms carefully. • **Comparing** organisms within the same species. • **Recording** findings using comparison tables and diagrams. • **Interpreting evidence** to explain how adaptations help survival.	
To classify living things in our local environment	• Local environments contain a variety of living things. • Living things can be identified and grouped using observable features. • Habitats affect the organisms found there. • Classification helps scientists study biodiversity.	**Observing** organisms in the local environment. Using classification keys. **Recording** observations. Grouping living things accurately.	• **Asking** scientific questions about local habitats and organisms. • **Observing** living things carefully in the outdoor environment. • **Sorting and grouping** organisms using classification keys. • Gathering and **Recording** data using tally charts and tables. • **Interpreting patterns** in local biodiversity.	

Year Four – Animals Including Humans

National Curriculum Statements:
• 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:
Year 2: • Identify and name a variety of common animals that are carnivores, herbivores and omnivores. • 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. **Year 3:** • 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.	**Year 6:** • 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.

Possible misconceptions	Assessment opportunities:
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"	• **Labelling activities** – Children label parts of the digestive system and different types of teeth • **Investigation activities** – Children investigate how food moves through the digestive system and how liquids affect teeth • **Comparison activities** – Children compare teeth from different animals and link them to diet • **Food chain activities** – Children construct and interpret food chains and food webs • **Discussion activities** – Children explain how the digestive system helps the body get energy • **Recording activities** – Children record findings using diagrams, tables and scientific vocabulary

Animals Including Humans				
Enquiry Question: How does the digestive system help the body get energy?				
Lesson objectives	**Knowledge**	**Skills**	**Working Scientifically**	**Vocabulary**
To identify the organs in the digestive system	• The digestive system helps break down food.	Identifying digestive organs. Labelling diagrams accurately.	• **Asking** scientific questions about how the body digests food.	digestive system digestion

	• The main organs are the mouth, oesophagus, stomach, small intestine and large intestine. • Each organ has a specific job. • Food travels through the digestive system.	Sequencing the digestive process. Using scientific vocabulary correctly.	• **Observing** diagrams and models of the digestive system carefully. • Identifying and labelling digestive organs accurately. • **Recording** findings using labelled scientific diagrams. • Explaining the role of the digestive system using scientific vocabulary.	oesophagus stomach intestine nutrients saliva molar incisor canine premolar enamel decay food chain food web producer consumer predator prey
To describe the functions of the main organs in the digestive system	• The mouth chews food and mixes it with saliva. • The oesophagus carries food to the stomach. • The stomach breaks food down further. • The intestines absorb nutrients and water. • Waste leaves the body through the digestive system.	Explaining the role of digestive organs. Sequencing digestion stages. **Comparing** organ functions. Using scientific vocabulary in explanations.	• **Asking** scientific questions about how digestion works. • **Observing** models and diagrams of digestive organs. • **Comparing** the functions of different organs. • **Recording** findings using flow diagrams and tables. • **Interpreting information**to explain the digestion process.	
To investigate how food moves through the digestive system	• Food moves through the digestive system in stages. • Digestion breaks food into nutrients the body can use. • Muscles help push food through the digestive system. • Nutrients are absorbed into the bloodstream.	Modelling the digestive process. **Observing** changes during **investigations**. Sequencing digestion accurately. **Recording** observations.	• **Asking** scientific questions about the movement of food through the body. • Making **predictions** before **investigations**. • Planning and carrying out practical models of digestion. • **Observing** changes carefully throughout **investigations**. • **Recording** findings using diagrams and sequencing charts. • **Interpreting results** to explain how food moves through the digestive system.	
To identify the types of human teeth and their functions	• Humans have different types of teeth. • Incisors cut food. • Canines tear food. • Molars grind food. • Teeth help begin the digestion process.	Identifying tooth types. **Comparing** tooth shapes. Labelling diagrams. Explaining functions using scientific vocabulary.	• **Asking** scientific questions about teeth and eating. • **Observing** teeth carefully using mirrors, models and diagrams. • **Comparing** different types of teeth. • **Recording** findings using labelled diagrams and tables. • Explaining how different teeth help humans eat food.	
To explore how teeth are linked to diet	• Teeth are adapted to different diets.	**Comparing** teeth from different animals. Identifying diets from teeth. Explaining adaptations.	• **Asking** scientific questions about diet and teeth. • **Observing** and **comparing** teeth from different animals. • **Identifying patterns** between teeth shape and diet.	

	• Herbivores, carnivores and omnivores have different teeth. • Human teeth are suited to an omnivorous diet. • Tooth shape helps animals eat different foods.	**Recording similarities and differences**.	• **Recording** findings using comparison charts and diagrams. • **Interpreting evidence** to explain how teeth are adapted to diet.	
To investigate the effects of different liquids on the teeth	• Sugary and acidic drinks can damage teeth. • Tooth enamel protects teeth. • Some drinks can stain or weaken enamel. • Good dental hygiene helps protect teeth.	Planning and carrying out **investigations**. **Observing** changes over time. **Recording** results carefully. Explaining findings **using evidence**.	• **Asking** scientific questions about tooth decay and liquids. • Making **predictions** before **investigations**. • Planning and carrying out a fair test using eggshells as tooth models. • **Observing** changes carefully over time. • **Recording** findings using tables and charts. • **Interpreting results** to explain how liquids affect teeth. • **Evaluating** the investigation and suggesting improvements.	
To understand how energy is transferred through a food chain	• Food chains show how energy moves between living things. • Plants are producers because they make their own food. • Animals are consumers. • Predators hunt prey for food.	Constructing food chains. Identifying producers, consumers, predators and prey. Sequencing food chains correctly. Explaining energy transfer.	• **Asking** scientific questions about food chains and energy. • **Observing** relationships between producers and consumers. • Sequencing food chains correctly. • **Recording** findings using labelled diagrams and arrows. • **Interpreting patterns** in how energy moves through a food chain.	
To understand and explore food webs	• Food webs show how living things are connected. • Animals can be part of more than one food chain. • Changes to one part of a food web affect other living things. • Food webs help explain ecosystems.	Constructing simple food webs. **Comparing** food chains and food webs. Identifying connections between organisms. Explaining how ecosystems depend on balance.	• **Asking** scientific questions about food webs and ecosystems. • **Observing** relationships between living things carefully. • **Comparing** food chains and food webs. • **Recording** findings using diagrams and charts. • **Interpreting evidence** to explain how organisms depend on one another	

Year Four – States of Matter

National Curriculum Statements:
• 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:
Year 1: aterial from which it is made. naterials, including wood, plastic, glass, metal, water, and rock. f a variety of everyday materials. everyday materials on the basis of their simple physical properties. **Year 2** ariety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and made from some materials can be changed by squashing, bending, twisting and stretching.	Year 5: • 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 **investigations**, 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.

Possible misconceptions	Assessment opportunities:
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	• **Sorting activities** – Children sort materials into solids, liquids and gases • **Observation activities** – Children observe how particles behave in different states of matter • **Investigation activities** – Children investigate melting, freezing, evaporation and condensation • **Measurement activities** – Children measure temperature changes using thermometers • **Discussion activities** – Children explain how and why materials change state • **Recording activities** – Children record results using tables, charts, graphs and labelled diagrams

• 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.	

States of Matter				
Enquiry Question: How and why do materials change state?				
Lesson objectives	**Knowledge**	**Skills**	**Working Scientifically**	**Vocabulary**
				solid liquid gas particles melting freezing evaporation condensation temperature water vapour state change heating cooling water cycle
To compare and group the three states of matter	• Materials can exist as solids, liquids or gases. • Solids keep their shape unless a force is applied. • Liquids flow and take the shape of their container. • Gases spread out and fill the space available. • Some materials can change state.	**Observing** properties of materials. Grouping materials into solids, liquids and gases. **Comparing** the properties of states of matter. Using scientific vocabulary accurately.	• **Asking** scientific questions about solids, liquids and gases. • **Observing** and **comparing** materials carefully. • **Sorting and grouping** materials by their state of matter. • **Recording** findings using tables and classification charts. • **Interpreting similarities and differences** between states of matter.	
To explore how particles behave in solids, liquids and gases	• Materials can change state when heated or cooled. • Heating can cause melting and evaporation. • Cooling can cause freezing and condensation. • Changes of state are usually reversible.	**Observing** changes of state. **Recording** temperature changes. **Comparing** materials before and after heating/cooling. Explaining changes using scientific vocabulary.	• **Asking** scientific questions about particle behaviour. • **Observing** models and demonstrations carefully. • **Comparing** how particles behave in different states. • **Recording** findings using labelled diagrams and scientific vocabulary. • **Interpreting evidence** to explain differences between solids, liquids and gases.	
To investigate how materials change state when heated or cooled	• Melting changes a solid into a liquid. • Freezing changes a liquid into a solid. • Different materials melt and freeze at different temperatures. • Heating and cooling affect particle movement.	Investigating melting and freezing. Measuring and **Recording** temperatures. **Comparing** materials. Predicting outcomes	• **Asking** scientific questions about changing states. • Making **predictions** before **investigations**. • Planning and carrying out simple comparative **investigations** safely. • **Observing** and measuring changes carefully over time.	

			• Recording findings using tables and diagrams. • Interpreting results to explain melting, freezing, evaporation and condensation.	
To investigate how temperature affects changes of state	• Temperature affects how quickly materials change state. • Heating speeds up particle movement. • Cooling slows particle movement. • Different materials respond differently to temperature changes. • Anders Celsius created the Celsius temperature scale used to measure heat and cold.	Measuring temperature changes. Observing materials during investigations. Recording results accurately. Explaining patterns in findings.	• Asking scientific questions about temperature and state changes. • Planning fair investigations using heating and cooling. • Measuring temperature accurately using thermometers. • Recording findings using tables, charts and graphs. • Interpreting patterns between temperature and changes of state.	
To explore evaporation and condensation	• Evaporation changes a liquid into a gas. • Condensation changes a gas into a liquid. • Heat speeds up evaporation. • Condensation happens when water vapour cools.	Observing evaporation and condensation. Recording changes over time. Comparing conditions that affect evaporation. Explaining observations using scientific vocabulary.	• Asking scientific questions about evaporation and condensation. • Observing changes of state carefully.\n- Comparing evaporation and condensation processes. • Recording findings using diagrams and sequencing charts. • Interpreting evidence to explain how evaporation and condensation occur.	
To investigate factors that affect evaporation	• Temperature affects the rate of evaporation. • Liquids evaporate faster in warm conditions. • Wind and surface area can also affect evaporation. • Evaporation happens in the water cycle.	Planning fair investigations. Measuring evaporation over time. Recording and comparing results. Identifying patterns in data.	• Asking scientific questions about evaporation. • Making predictions before investigations. • Planning and carrying out comparative investigations fairly. • Observing and measuring evaporation over time. • Recording findings using tables, charts and graphs. • Interpreting results to identify factors that affect evaporation. • Evaluating the investigation and suggesting improvements.	

To understand the water cycle	• The water cycle describes how water moves around Earth. • The Sun heats water causing evaporation. • Water vapour cools and condenses into clouds. • Precipitation returns water to Earth.	Sequencing stages of the water cycle. Labelling diagrams accurately. Explaining processes using scientific vocabulary. **Comparing** stages of the cycle.	• **Asking** scientific questions about the movement of water in the environment. • **Observing** models and diagrams of the water cycle. • Sequencing stages of the water cycle accurately. • **Recording** findings using labelled scientific diagrams. • **Interpreting evidence** to explain how water changes state throughout the cycle.	

Year Four - Sound

National Curriculum Statements:
• 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:
EYFS: • Explore how things work. • Describe what they see, hear and feel whilst outside **Year 1:** • Identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense.	**KS3:** • Waves on water as undulations which travel through water with transverse motion; these waves can be reflected, and add or cancel – superposition. • Frequencies of sound waves, measured in Hertz (Hz); echoes, reflection and absorption of sound. • Sound needs a medium to travel, the speed of sound in air, in water, in solids. • Sound produced by vibrations of objects, in loud speakers, detected by their effects on microphone diaphragm and the ear drum; sound waves are longitudinal. • Auditory range of humans and animals. • Pressure waves transferring energy; use for cleaning and physiotherapy by ultra-sound. • Waves transferring information for conversion to electrical signals by microphone

Possible misconceptions	Assessment opportunities:
Some children may think: • sound is only heard by the listener • sound only travels in one direction from the source • sound can't travel through solids and liquids • high sounds are load and low sounds are quiet.	• Investigation activities – Children investigate how sounds are made and how sound travels • Observation activities – Children observe vibrations using musical instruments and practical equipment • Comparison activities – Children compare pitch, volume and sound insulation materials • Measurement activities – Children investigate how sound changes over distance • Discussion activities – Children explain how sound travels and changes • **Recording** activities – Children record findings using tables, charts and labelled diagrams

Sound				
Enquiry Question: How does sound travel and change?				
Lesson objectives	**Knowledge**	**Skills**	**Working Scientifically**	**Vocabulary**

To understand how we hear sound	• Sound enters the ear as vibrations. • Vibrations travel through the ear to the brain. • The brain helps us recognise sounds. • Ears are important for hearing and balance. • Evelyn Glennie uses vibrations to understand sound even though she is deaf.	Identifying parts of the ear. Sequencing how sound travels through the ear. Explaining the hearing process. Using scientific vocabulary accurately.	• **Asking** scientific questions about how humans hear sounds. • **Observing** models and diagrams of the ear carefully. • Identifying and sequencing how sound travels through the ear. • **Recording** findings using labelled diagrams and flow charts. • **Interpreting evidence** to explain how we hear sound.	sound vibration volume pitch sound wave insulation travel source medium distance loud quiet high pitch low pitch
To identify how sounds are made	• Sounds are made when objects vibrate. • Vibrations can be caused by hitting, shaking, plucking or scraping. • Bigger vibrations can make louder sounds. • If vibrations stop, the sound stops.	**Observing** vibrations. Identifying sound sources. **Comparing** different ways sounds are made. Explaining observations using scientific vocabulary.	• **Asking** scientific questions about sound production. • **Observing** how vibrations create sound using practical **investigations**. • **Comparing** sounds made by different objects. • **Recording** findings using tables and labelled diagrams. • **Interpreting observations** to explain that sounds are caused by vibrations.	
To explore how sound travels	• Sound travels through solids, liquids and gases. • Sound travels as vibrations. • Sound cannot travel through a vacuum. • Different materials carry sound differently.	Investigating how sound moves through materials. **Comparing** sounds through different mediums. **Recording** observations. Explaining findings.	• **Asking** scientific questions about how sound moves. • **Observing** sound travelling through solids, liquids and gases. • **Comparing** how sound behaves in different materials. • **Recording** findings using diagrams and comparison tables. • **Interpreting evidence** to explain how vibrations travel through a medium.	
To explore sound insulation	• Some materials absorb sound better than others. • Soft materials can reduce sound. • Sound insulation helps block unwanted noise. • Different materials are suitable for different purposes.	Testing soundproofing materials. **Comparing** effectiveness of materials. **Recording** results accurately. Explaining conclusions **using evidence**.	• **Asking** scientific questions about sound insulation. • Making **predictions** about which materials will block sound best. • Planning and carrying out comparative **investigations** fairly. • **Observing** and measuring sound levels carefully.	

			• **Recording** findings using tables and charts. • **Interpreting results** to identify effective sound insulating materials.	
To explore volume	• Volume describes how loud or quiet a sound is. • Stronger vibrations create louder sounds. • Weaker vibrations create quieter sounds. • Volume can be controlled.	**Comparing** loud and quiet sounds. **Observing** vibration strength. **Recording** findings. Explaining how vibrations affect volume.	• **Asking** scientific questions about loud and quiet sounds. • **Observing** how vibrations affect volume. • **Comparing** sounds produced with different amounts of force. • **Recording** findings using tables and diagrams. • **Interpreting evidence** to explain how stronger vibrations create louder sounds.	
To explore pitch	• Pitch describes how high or low a sound is. • Faster vibrations create higher pitch sounds. • Slower vibrations create lower pitch sounds. • Pitch changes depending on the object making the sound.	**Comparing** high and low pitch sounds. Investigating how pitch changes. **Recording** observations. **Identifying patterns**.	• **Asking** scientific questions about high and low sounds. • **Observing** how vibrations affect pitch. • **Comparing** sounds from different instruments and objects. • **Recording** findings using charts and labelled diagrams. • **Interpreting results** to explain how vibration speed affects pitch.	
To explore how sound changes over distance	• Sounds become quieter as distance increases. • Vibrations lose energy over distance. • Sounds can become harder to hear when further away. • Distance affects sound volume.	Measuring distances during **investigations**. **Comparing** sound levels. **Recording** results accurately. **Identifying patterns** in findings.	• **Asking** scientific questions about sound and distance. • Making **predictions** before **investigations**. • Planning and carrying out comparative **investigations** fairly. • **Observing** and measuring how sound changes over distance. • **Recording** findings using tables, charts and graphs. • **Interpreting patterns** in results to explain how distance affects sound	

Year Four - Electricity

National Curriculum Statements:
• 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:
EYFS: • Explore how things work	Year 6: • 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.

Possible misconceptions	Assessment opportunities:
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	• **Circuit activities** – Children construct and test simple series circuits • **Investigation activities** – Children investigate what affects whether a circuit works • **Classification activities** – Children sort materials into conductors and insulators • **Observation activities** – Children observe how switches control circuits • **Discussion activities** – Children explain how electricity flows through a circuit safely • **Drawing and labelling** – Children draw and label simple electrical circuits accurately

Electricity				
Enquiry Question: What makes an electrical circuit work?				
Lesson objectives	**Knowledge**	**Skills**	**Working Scientifically**	**Vocabulary**
				electricity appliance electrical safety circuit series circuit component bulb buzzer motor
• To explore electrical appliances and electrical safety	• Many everyday appliances use electricity. • Some appliances use mains electricity and others use batteries. • Electricity can be dangerous if used unsafely. • Water and damaged wires can increase electrical danger.	Identifying electrical appliances. **Sorting** appliances by power source. Recognising safe and unsafe situations. Explaining electrical safety rules.	• **Asking** scientific questions about electricity and safety. • **Observing** electrical appliances carefully in the home and school environment. • **Sorting** appliances according to how they use electricity. • **Recording** findings using tables and classification charts.	

	• Safety rules help protect us around electricity. • Lewis Latimer improved the lightbulb and helped make electric lighting safer and more useful.		• **Interpreting evidence** to explain safe use of electricity.	wire cell battery conductor insulator switch current complete circuit
• To explore electrical components in a series circuit	• A series circuit is a complete loop. • Common components include cells, wires, bulbs, buzzers and motors. • Electricity flows around a complete circuit. • All components in a series circuit are connected in one loop	Identifying circuit components. Building simple series circuits. Labelling circuit diagrams. Explaining the role of each component.	• **Asking** scientific questions about electrical circuits. • **Observing** electrical components carefully. • Constructing simple series circuits safely. • **Recording** findings using labelled diagrams and circuit drawings. • Explaining the role of components within a circuit.	
• To investigate electrical circuits	• A complete circuit allows electricity to flow. • A broken circuit stops electricity flowing. • Components must be connected correctly. • Electricity travels through conductors in the circuit.	Constructing working circuits. Testing complete and incomplete circuits. **Observing** what happens in different circuits. **Explaining why** circuits do or do not work.	• **Asking** scientific questions about how circuits work. • Making **predictions** before **investigations**. • Planning and carrying out simple circuit **investigations**. • **Observing** whether circuits work correctly. • **Recording** findings using tables and circuit diagrams. • **Interpreting results** to explain how complete circuits work.	
• To explore conductors and insulators	• Conductors allow electricity to flow through them. • Insulators stop or reduce the flow of electricity. • Metals are usually conductors. • Plastic, rubber and wood are often insulators.	Testing materials in a circuit. **Comparing** conductors and insulators. **Recording** results accurately. Explaining findings **using evidence**.	• **Asking** scientific questions about electrical conductivity. • Making **predictions** about different materials. • Planning and carrying out comparative **investigations** fairly. • **Observing** and testing materials in circuits carefully. • **Recording** findings using tables and classification charts. • **Interpreting results** to identify conductors and insulators.	
• To explore electrical switches and how they work	• A switch opens and closes a circuit. • Opening a switch breaks the circuit. • Closing a switch completes the circuit.	Building circuits with switches. Testing how switches affect circuits. **Observing** changes in a circuit. Explaining how switches work.	• **Asking** scientific questions about switches and circuits. • **Observing** how switches affect the flow of electricity.	

	• Switches help control electrical devices safely.		• Constructing circuits with switches safely. • **Recording** findings using labelled diagrams and tables. • Explaining how switches open and close circuits.	
• To investigate what affects whether a circuit works	• A circuit only works when it is complete. • Loose wires or incorrect connections can stop a circuit working. • Flat batteries may stop circuits from working. • Some materials stop electricity from flowing.	Investigating problems in circuits. Making **predictions**. Testing and correcting circuits. **Explaining why** circuits work or fail.	• **Asking** scientific questions about why circuits fail or succeed. • Making **predictions** before **investigations**. • Planning and carrying out comparative **investigations** using different components. • **Observing** and testing circuits carefully. • **Recording** findings using tables, charts and circuit diagrams. • **Interpreting evidence** to explain what makes a circuit work successfully.	

Year Four- Title of Unit: Conservation

National Curriculum Statements:
• Recognise that environments can change and that this can sometimes pose dangers to living things • Identify how habitats provide for the basic needs of living things. • Construct and interpret food chains, identifying producers, predators and prey. • Report findings from enquiries, including oral and written explanations and displays of results and conclusions.

Prior Learning:	Future Learning:
Year 2 • Identify that most living things live in habitats to which they are suited. • Describe how habitats provide for the basic needs of plants and animals. • Describe simple food chains and identify sources of food. • Explore differences between living, dead and never alive things. **Year 4** • Recognise that living things can be grouped in a variety of ways. • Use classification keys to identify living things in the local environment.	**Year 5** • Describe the life processes of reproduction in plants and animals. • Understand how environments can affect living things and their survival. **Year 6** • Describe how living things are classified into broad groups according to observable characteristics. • Recognise that living things have changed over time and adapted to their environments. • Understand how human activity can impact biodiversity and ecosystems. **KS3** • Relationships in ecosystems, including food webs and interdependence. • The impact of human activity on the environment and biodiversity. • The importance of sustainable development and conservation.

Possible misconceptions	Assessment opportunities:
• Humans only harm the environment and cannot help it. • Pollution only happens in factories. • Clean water is unlimited. • Deforestation only affects trees. • Animals can quickly adapt to any environmental change. • Conservation only happens in rainforests or oceans. • Ecosystems only include animals.	• Discussion activities – Children explain how environmental changes affect living things. • Investigation activities – Children investigate pollution, water usage and conservation methods. • Observation activities – Children observe local habitats and identify human impact. • Classification activities – Children group living and non-living parts of ecosystems. • **Recording** activities – Children present findings using charts, posters and labelled diagrams. • Debate and oracy activities – Children discuss how humans can positively or negatively affect the environment. • Data handling activities – Children gather and interpret information about pollution and conservation. • Persuasive writing/poster activities – Children create campaigns encouraging environmental protection.

Conservation				
Enquiry Question: How can humans protect the world around them?				
Lesson objectives	**Knowledge**	**Skills**	**Working Scientifically**	**Vocabulary**
				ecosystem habitat season temperature environment living non-living depend deforestation forest food chain conservation pollution air pollution smoke gases factory climate water pollution river ocean waste chemicals litter conserve resource reuse reduce recycle wildlife sustainability protect
To describe ecosystems and how they are affected by changes in the seasons	• An ecosystem is made up of living and non-living things. • Plants and animals depend on each other to survive. • Seasonal changes affect ecosystems. • Changes in temperature and weather affect living things.	Identifying parts of ecosystems. **Comparing** seasonal changes. Explaining how living things depend on each other. Using scientific vocabulary accurately	• **Observing** seasonal changes carefully. • **Identifying patterns** in ecosystems. • **Recording** findings using charts and diagrams. • **Asking** scientific questions about habitats and change.	
To understand human impact on the environment through deforestation	• Deforestation is the removal of forests and trees. • Forests provide habitats for living things. • Deforestation can damage ecosystems and food chains. • Humans can reduce deforestation by protecting forests.	Explaining environmental change. **Comparing** before and after environments. **Interpreting** images and data. Using scientific vocabulary accurately.	• **Observing** environmental changes using secondary sources. • **Identifying patterns** in habitat loss. • **Recording** findings using diagrams and discussion. • **Using evidence** to explain ideas.	
To explore air pollution	• Air pollution is caused by harmful gases and smoke. • Pollution can harm humans, animals and plants. • Cars and factories can cause pollution. • Reducing pollution helps protect the environment.	Identifying sources of pollution. **Comparing** clean and polluted environments. Discussing solutions. **Recording** observations clearly.	• **Observing** evidence of pollution. • Gathering and **Recording** data. • **Asking** scientific questions about pollution. • **Using observations** to suggest answers to questions.	
To understand water pollution	• Water pollution happens when harmful substances enter water. • Pollution can affect plants, animals and habitats. • Clean water is important for survival. • Humans can help reduce water pollution.	Identifying causes of pollution. **Comparing** clean and polluted water. Explaining impacts on habitats. Using scientific vocabulary.	• Carrying out **simple investigations**. • **Observing** changes carefully. • **Recording** findings using tables and diagrams. • **Using evidence** to explain results.	
To explore methods that can	• Water is an important resource. • Conserving water means reducing waste.	Measuring water usage. **Comparing** methods of saving water.	• Gathering and **Recording** data.	

be used to conserve water	• Humans can save water in everyday life. • Small actions can make a difference.	Discussing environmental responsibility. **Interpreting** results.	• Carrying out comparative **investigations**. • **Observing patterns** in water use. • **Using evidence** to suggest improvements.	
To understand that humans can have a positive impact on nature	• Humans can protect habitats and wildlife. • Conservation projects help ecosystems recover. • Recycling and reducing waste can protect the planet. • Everyone can help care for the environment.	Identifying positive environmental actions. Designing conservation ideas. Explaining how humans help nature. Using scientific vocabulary accurately.	• **Researching** using secondary sources. • **Recording** findings using posters, charts and presentations. • **Asking** scientific questions about conservation. • **Using evidence** to support ideas and conclusions.	

Year Five – Living Things and their Habitats

National Curriculum Statements:
• 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:
Year 2: • Notice that animals, including humans, have offspring which grow into adults **Year 3:** • Explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal	**KS3:** • 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. • Reproduction in plants, including flower structure, wind and insect pollination, fertilisation, seed and fruit formation and dispersal, including quantitative investigation of some dispersal mechanisms.

Possible misconceptions	Assessment opportunities:
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.	• **Sequencing activities** – Children sequence the life cycles of plants, mammals, insects, amphibians and birds • **Comparison activities** – Children compare **similarities and differences** between life cycles • **Observation activities** – Children observe stages of growth and development in living things • **Investigation activities** – Children investigate how plants and animals reproduce • **Discussion activities** – Children explain how living things grow and reproduce • **Drawing and labelling** – Children draw and label life cycles accurately

Living Things and their Habitats				
Enquiry Question: How do living things grow, reproduce and change throughout their lives?				
Lesson objectives	**Knowledge**	**Skills**	**Working Scientifically**	**Vocabulary**
To understand the life processes of a plant	• Plants have life processes including growth and reproduction.	Sequencing stages of a plant life cycle. Identifying parts involved in reproduction.	• **Asking** scientific questions about plant growth and reproduction.	life cycle reproduction metamorphosis

	• Flowering plants begin as seeds and grow into mature plants. • Plants produce seeds to create new plants. • Pollination is an important part of the plant life cycle.	**Observing** changes over time. Using scientific vocabulary accurately.	• **Observing** plant life cycles carefully using diagrams, videos and real plants. • **Comparing** stages of plant development. • **Recording** findings using labelled diagrams and life cycle charts. • **Interpreting evidence** to explain how plants grow and reproduce.	mammal amphibian insect bird gestation pollination fertilisation sexual reproduction asexual reproduction offspring adulthood
To understand the life processes of mammals	• Mammals are born alive and grow into adults. • Mammal offspring depend on parents for survival. • Mammals reproduce to continue their species. • Mammals go through stages of growth and development.	Sequencing mammal life cycles. **Comparing** young and adult mammals. **Observing similarities and differences**. Explaining stages using scientific vocabulary.	• **Asking** scientific questions about mammal life cycles. • **Observing similarities and differences** between young and adult mammals. • **Comparing** stages of development in mammals. • **Recording** findings using timelines and comparison tables. • **Interpreting patterns** in mammal growth and development.	
To understand the life processes of insects	• Many insects go through metamorphosis. • Insects may have four stages: egg, larva, pupa and adult. • Different insects have different life cycles. • Life cycles help insects survive and reproduce. • Maria Sibylla Merian carefully studied insects and discovered how they change during their life cycles.	Sequencing insect life cycles. **Comparing** life stages. **Observing** changes over time. **Recording** findings using diagrams.	• **Asking** scientific questions about insect life cycles. • **Observing** stages of metamorphosis carefully. • **Comparing** complete and incomplete metamorphosis. • **Recording** findings using diagrams and sequencing charts. • **Interpreting evidence** to explain changes during insect development.	
To understand the life process of amphibians	• Amphibians begin life in water. • Frogs undergo metamorphosis from tadpole to adult. • Amphibians change significantly as they grow. • Adult amphibians reproduce by laying eggs.	Sequencing amphibian life cycles. **Comparing** stages of development. **Observing** changes over time. Explaining metamorphosis.	• **Asking** scientific questions about amphibian life cycles. • **Observing** changes during metamorphosis carefully. • **Comparing** life stages of amphibians. • **Recording** findings using labelled diagrams and life cycle charts. • **Interpreting patterns** in amphibian development.	

To understand the life processes of birds	• Birds hatch from eggs. • Young birds grow into adults over time. • Parent birds often care for their offspring. • Birds reproduce by laying eggs.	Sequencing bird life cycles. **Comparing** chicks and adult birds. **Observing** growth and development. **Recording** findings.	• **Asking** scientific questions about bird life cycles. • **Observing similarities and differences** between chicks and adult birds. • **Comparing** stages of bird development. • **Recording** findings using timelines and diagrams. • **Interpreting evidence** to explain bird growth and reproduction.	
To compare life cycles	• Different living things have different life cycles. • Some organisms undergo metamorphosis while others do not. • All life cycles include growth and reproduction. • Life cycles help species continue.	**Comparing** life cycles. **Identifying similarities and differences**. **Recording** comparisons. Explaining findings using scientific vocabulary.	• **Asking** scientific questions about **similarities and differences** between life cycles. • **Observing** and **comparing** life cycle stages carefully. • **Sorting and grouping** organisms by life cycle characteristics. • **Recording** findings using comparison tables and Venn diagrams. • **Interpreting patterns** between different life cycles.	
To understand how animals reproduce	• Animals reproduce to create offspring. • Offspring grow and develop into adults. • Some animals lay eggs while others give birth to live young. • Reproduction is essential for survival of a species.	**Comparing** methods of animal reproduction. Sequencing reproductive stages. **Observing similarities and differences**. Explaining life processes clearly.	• **Asking** scientific questions about animal reproduction. • **Observing** examples of reproduction in different animal groups. • **Comparing** reproductive processes between species. • **Recording** findings using diagrams and flow charts. • **Interpreting evidence** to explain how reproduction supports survival of species.	
To understand how plants reproduce	• Plants reproduce to create new plants. • Flowering plants reproduce sexually through pollination and seed formation. • Some plants can reproduce asexually using runners, bulbs, tubers or cuttings. • Different methods of reproduction help plants survive in different environments.	**Comparing** sexual and asexual reproduction in plants. **Observing** different plant reproduction methods. Identifying adaptations for reproduction and dispersal. Explaining how reproduction supports survival of a species. **Recording** comparisons using scientific vocabulary.	• **Asking** scientific questions about plant reproduction. • **Observing** flowers, seeds and plant structures carefully. • **Comparing** sexual and asexual reproduction in plants. • **Recording** findings using labelled diagrams and comparison charts. • **Interpreting evidence** to explain how plants reproduce and survive.	

	• Seeds are dispersed in different ways to reduce competition.			

Year Five- Animals Including Humans

National Curriculum Statements:
• Describe the changes as humans develop to old age.

Prior Learning:	Future Learning:
Year 2: • Notice that animals, including humans, have offspring which grow into adults	**KS3:** • 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.

Possible misconceptions	Assessment opportunities:
Some children may think: • a baby grows in a mother's tummy • a baby is "made"	• **Sequencing activities** – Children sequence stages of human growth and development • **Investigation activities** – Children investigate how exercise affects the circulatory and muscular systems • **Comparison activities** – Children compare lifestyles and their impact on health • **Observation activities** – Children observe and record changes in pulse rate after exercise • **Discussion activities** – Children explain how humans change and stay healthy throughout life • **Recording activities** – Children record findings using tables, charts and graphs

Title of Unit: Animals Including Humans				
Enquiry Question: How do humans change and stay healthy throughout life?				
Lesson objectives	**Knowledge**	**Skills**	**Working Scientifically**	**Vocabulary**
To understand how humans grow and develop over time	• Humans experience continuous growth and development throughout life. • Development includes physical, emotional and social changes. • Humans develop at different rates. • Major stages of development include infancy, childhood, adolescence, adulthood and old age.	**Comparing** stages of human development. **Interpreting** growth and development information. Identifying physical and emotional changes across life stages. Discussing human development respectfully and scientifically. Using scientific vocabulary accurately.	• **Asking** scientific questions about human growth and development. • **Observing similarities and differences** between stages of human life. • **Comparing** physical, emotional and social changes over time. • **Recording** findings using timelines, charts and comparison tables.	puberty adolescence gestation development ageing lifestyle circulatory system muscular system pulse exercise

	• Growth **patterns** can be influenced by genetics, diet, exercise and lifestyle.		• **Interpreting patterns** in human growth and development.	hormones reproduction nutrients wellbeing
To understand the physical and emotional changes during puberty	• Puberty is the process that changes a child's body into an adult body capable of reproduction. • Hormones trigger physical and emotional changes during puberty. • Puberty occurs at different times for different people. • Changes during puberty are natural and normal.	Identifying physical and emotional changes linked to puberty. **Comparing** changes experienced by males and females. **Interpreting information**respectfully. Using scientific vocabulary correctly and confidently.	• **Asking** scientific questions about puberty and body changes. • **Observing** and **comparing** changes during puberty respectfully. • **Identifying patterns** in physical and emotional development. • **Recording** findings using diagrams, charts and scientific vocabulary. • **Interpreting evidence** to explain changes during puberty.	
To investigate how lifestyle affects the human body	• Lifestyle choices affect physical and mental health. • Diet, exercise, sleep and screen time impact body systems. • Healthy lifestyles reduce the risk of illness and disease. • Poor lifestyle choices can negatively affect growth and wellbeing.	**Interpreting** lifestyle data. **Comparing** healthy and unhealthy habits. Explaining impacts on the body. Presenting evidence-based conclusions.	• **Asking** scientific questions about healthy and unhealthy lifestyles. • Making **predictions** about how lifestyle choices affect the body. • **Researching** and **comparing** different lifestyle factors. • **Recording** findings using tables, charts and graphs. • **Interpreting evidence** to explain how lifestyle affects health and wellbeing.	
To understand the changes that happen as humans age	• Ageing causes gradual changes to the body and mind. • Strength, movement, hearing and vision may change with age. • Lifestyle choices can influence health in later life. • Ageing is a natural process experienced by all living things.	**Comparing** stages of ageing. **Interpreting information**about ageing. Discussing changes respectfully. **Recording** observations accurately.	• **Asking** scientific questions about ageing. • **Observing** and **comparing** changes across different stages of life. • **Identifying similarities and differences** in growth and ageing. • **Recording** findings using timelines and comparison charts. • **Interpreting patterns** in how humans change over time.	
To understand the importance of exercise on the circulatory and muscular systems	• Exercise strengthens muscles and improves fitness. • Physical activity affects heart rate and breathing rate. • Regular exercise supports long-term health. • Different exercises affect the body in different ways.	Measuring pulse rates. **Recording** results in tables/charts. **Comparing** results before and after exercise. Explaining how exercise affects the body.	• **Asking** scientific questions about exercise and the body. • Planning and carrying out comparative **investigations** fairly. • **Observing** and measuring pulse rates and body responses accurately. • **Recording** findings using tables, charts and graphs.	

			• **Interpreting results** to explain how exercise affects the circulatory and muscular systems. • **Evaluating** the investigation and suggesting improvements.	
To investigate gestation periods in animals	• Gestation is the time offspring develop inside the mother before birth. • Different animals have different gestation periods. • Gestation length is linked to animal size and development. • Mammals invest different amounts of care in offspring.	**Interpreting** charts and tables. **Comparing** gestation periods. **Identifying patterns** in data. Drawing conclusions from evidence.	• **Asking** scientific questions about animal development and reproduction. • **Observing** and **comparing** gestation data from different animals. • **Identifying patterns** between animal size and gestation period. • **Recording** findings using tables, charts and graphs. • **Interpreting evidence** to explain differences in gestation periods between species.	

Year Five- Properties and Changes of Materials

National Curriculum Statements:
• 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 **investigations**, 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:
Year 2: • 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 **Year 3:** • 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 **Year 4:** • 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). • Identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature	**KS3:** • Chemical reactions as the rearrangement of atoms. • Representing chemical reactions using formulae and using equations. • Combustion, thermal decomposition, oxidation and displacement reactions. • Defining acids and alkalis in terms of neutralisation reactions.

Possible misconceptions	Assessment opportunities:
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.	• • **Investigation activities** – Children investigate thermal conductivity, electrical conductivity and solubility • **Comparison activities** – Children compare materials based on their properties and suitability • **Separation activities** – Children separate mixtures using filtering, sieving and evaporation

	• **Observation activities** – Children observe reversible and irreversible changes • **Discussion activities** – Children explain why different materials are useful for different purposes • **Recording activities** – Children record findings using tables, graphs and labelled diagrams

Properties and Changes of Materials				
Enquiry Question: How can the properties of materials change and why does this matter?				
Lesson objectives	**Knowledge**	**Skills**	**Working Scientifically**	**Vocabulary**
To investigate and compare material properties scientifically	• Materials can be compared based on measurable properties. • Properties include hardness, transparency, magnetism, conductivity and solubility. • Scientists use evidence from **investigations** to classify materials. • Materials are selected for uses based on scientific properties. • Stephanie Kwolek invented Kevlar, a strong material used in protective equipment such as helmets and vests.	Planning comparative **investigations**. Measuring and Recording results systematically. **Comparing** evidence from **investigations**. Drawing conclusions from scientific data. Using precise scientific vocabulary.	• **Asking** scientific questions about the properties of materials. • Making **predictions** before **investigations**. • Planning and carrying out comparative **investigations** fairly. • **Observing** and measuring material properties accurately. • Recording findings using tables, charts and scientific diagrams. • **Interpreting results** to compare and classify materials.	conductivity thermal conductor thermal insulator electrical conductor electrical insulator dissolving solubility soluble insoluble solution mixture filtration evaporation reversible change irreversible change chemical change reaction
To explore thermal conductivity	• Thermal energy transfers through materials at different rates. • Thermal conductors transfer heat efficiently. • Thermal insulators reduce heat transfer. • Material choice affects heat retention and safety.	Measuring temperature changes over time. **Comparing** heat transfer in materials. Recording data in tables/charts. **Interpreting** investigation results.	• **Asking** scientific questions about heat transfer in materials. • Making **predictions** about which materials conduct heat best. • Planning and carrying out comparative **investigations** safely. • **Observing** and measuring temperature changes accurately. • Recording findings using tables and graphs. • **Interpreting evidence** to identify thermal conductors and insulators.	
To investigate electrical conductivity	• Electrical conductivity varies between materials. • Metals are usually good electrical conductors.	Building controlled test circuits. Testing conductivity systematically. Recording results accurately. Explaining findings using scientific reasoning.	• **Asking** scientific questions about electrical conductivity. • Making **predictions** about conductive and insulating materials.	

	• Insulators reduce electrical flow and improve safety. • Conductivity affects how materials are used in technology.		• Planning and carrying out comparative **investigations** using circuits. • **Observing** and testing materials carefully. • **Recording** findings using tables and classification charts. • **Interpreting evidence** to explain which materials conduct electricity.	
To investigate dissolving and solubility	• Dissolving occurs when a solute mixes evenly into a solvent. • Solubility varies between materials. • Temperature can affect dissolving rate. • Dissolving forms a solution.	**Observing** dissolving processes carefully. **Comparing** dissolving rates. Measuring quantities fairly. **Recording** observations scientifically.	• **Asking** scientific questions about dissolving and solubility. • Making **predictions** before **investigations**. • Planning and carrying out fair **investigations** using different materials and liquids. • **Observing** and measuring dissolving carefully over time. • **Recording** findings using tables, charts and diagrams. • **Interpreting patterns** in solubility results.	
To investigate how mixtures can be separated	• Mixtures contain substances that are not chemically joined. • Sieving, filtering and evaporation separate materials in different ways. • Separation methods depend on material properties. • Some dissolved substances can be recovered through evaporation.	Selecting appropriate separation methods. Carrying out separation **investigations** safely. **Explaining why** methods work. **Recording** conclusions **using evidence**.	• **Asking** scientific questions about separating mixtures. • **Observing** different separation methods carefully. • Planning and carrying out **investigations** using filtering, sieving and evaporation. • **Recording** findings using diagrams and tables. • **Interpreting evidence** to explain which separation methods are most effective.	
To investigate reversible changes	• Reversible changes can be undone. • Melting, freezing and dissolving are usually reversible. • Reversible changes do not create new materials.	**Observing** reversible changes. **Comparing** materials before and after changes. Identifying evidence of reversibility. **Recording** observations scientifically.	• **Asking** scientific questions about reversible changes. • **Observing** materials carefully before and after changes. • **Comparing** physical changes in materials.	

	• Heating and cooling can cause physical changes.		• **Recording** findings using tables and labelled diagrams. • **Interpreting evidence** to explain why some changes are reversible.	
To investigate irreversible changes	• Irreversible changes create new materials. • Burning, rusting and some chemical reactions are irreversible. • Irreversible changes are often difficult or impossible to undo. • Chemical reactions can produce gases, temperature changes or colour changes.	**Observing** chemical changes safely. Identifying signs of irreversible change. **Recording** evidence carefully. Explaining findings scientifically.	• **Asking** scientific questions about irreversible changes. • Planning and carrying out **investigations** safely. • **Observing** chemical changes carefully. • **Recording** findings using tables, charts and scientific vocabulary. • **Interpreting results** to explain why some changes cannot be reversed. • **Evaluating investigations** and suggesting improvements.	
To design an investigation to identify the most suitable material for a purpose	• Scientists test materials to determine suitability. • Different properties make materials suitable for different purposes. • Fair testing improves reliability of results. • Evidence is used to justify material choices.	Designing fair **investigations** independently. Selecting appropriate variables. Measuring accurately. Analysing and **interpreting** results. Presenting evidence-based conclusions.	• **Asking** scientific questions about material suitability. • Planning **investigations** independently and selecting appropriate equipment. • Carrying out comparative and fair **investigations** accurately. • **Observing** and measuring results carefully. • **Recording** findings using tables, graphs and scientific diagrams. • **Interpreting evidence** to justify material choices. • **Evaluating** the reliability of **investigations** and suggesting improvements.	

Year Five- Earth and Space

National Curriculum Statements:
• 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:
• Explore the natural world around them. (Reception – Earth and space) • Describe what they see, hear and feel whilst outside. (Reception – Earth and space) • 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 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)

Possible misconceptions	Assessment opportunities:
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	• **Observation activities** – Children observe models of the solar system, Moon phases and Earth's movement in space • **Investigation activities** – Children investigate how day and night and seasons occur • **Comparison activities** – Children compare heliocentric and geocentric models of the solar system • **Research activities** – Children research how scientific ideas about space have changed over time • **Discussion activities** – Children explain how movements in space affect life on Earth • **Drawing and labelling** – Children draw and label the solar system, Moon phases and Earth's orbit accurately

Earth and Space				
Enquiry Question: How do movements in space affect life on Earth?				
Lesson objectives	**Knowledge**	**Skills**	**Working Scientifically**	**Vocabulary**
				solar system Sun planet
To explore the solar system and its planets	• The solar system consists of the Sun, planets and other objects.	Identifying planets in the solar system. **Comparing** planetary features.	• **Asking** scientific questions about the solar system and planets.	

	• The Sun is a star at the centre of the solar system. • Planets orbit the Sun. • The eight planets have different sizes and features. • Gravity keeps planets in orbit around the Sun.	Using models and diagrams to explain space concepts. Using scientific vocabulary accurately	• **Observing** models, diagrams and videos of space carefully. • **Comparing** the planets based on size, position and features. • **Recording** findings using tables, charts and labelled diagrams. • **Interpreting patterns** within the solar system.	orbit rotate axis heliocentric Moon phases gravity seasons eclipse day night Earth spherical astronomer Galileo Copernicus
To understand the heliocentric model of the solar system	• The heliocentric model places the Sun at the centre of the solar system. • Planets orbit the Sun. • Ancient scientists once believed Earth was at the centre of the universe. • Scientists such as Copernicus and Galileo helped develop the heliocentric model. • Scientific ideas change when new evidence is discovered.	**Comparing** scientific models. Identifying planets in the solar system. **Interpreting** diagrams and models. Explaining scientific ideas **using evidence**.	• **Asking** scientific questions about how the solar system is organised. • **Observing** models of heliocentric and geocentric theories. • **Comparing** scientific models carefully. • **Recording** findings using diagrams and comparison charts. • **Interpreting evidence** to explain why the heliocentric model is accepted today.	
To explain the Earth's movement in space	• Earth orbits the Sun once every 365 days. • Earth travels in an elliptical orbit. • Gravity keeps Earth in orbit around the Sun. • Earth's orbit and tilt contribute to seasonal changes. • The Earth is constantly moving in space. • Mae Jemison was the first Black woman in space and inspired many people to become scientists and astronauts.	Using models to demonstrate orbiting. **Interpreting** diagrams of Earth's movement. Explaining how orbit affects Earth. Using scientific vocabulary accurately.	• **Asking** scientific questions about Earth's movement. • **Observing** models and simulations of Earth's orbit and rotation. • **Comparing** rotation and orbit movements. • **Recording** findings using labelled diagrams and sequencing charts. • **Interpreting evidence** to explain how Earth moves in space.	
To understand how the movement of the Earth causes day and night	• Earth rotates on its axis approximately every 24 hours. • Day occurs when part of Earth faces the Sun. • Night occurs when part of Earth faces away from the Sun. • The Sun appears to move across the sky because Earth rotates. • Different time zones exist because different parts of Earth face the Sun at different times.	Using globes and models to explain rotation. **Interpreting** diagrams of day and night. **Comparing** daylight **patterns** around the world. Explaining scientific concepts clearly.	• **Asking** scientific questions about day and night. • **Observing** models using light sources and globes. • **Comparing** areas of Earth experiencing day and night. • **Recording** findings using diagrams and scientific explanations. • **Interpreting evidence** to explain how Earth's rotation causes day and night.	
To understand the movement of the	• The Moon orbits Earth.	**Observing** lunar **patterns**. **Interpreting** Moon phase diagrams.	• **Asking** scientific questions about the Moon's movement.	

Moon relative to Earth	• The Moon does not produce its own light. • We see the Moon because it reflects sunlight. • The Moon appears to change shape during its orbit.	**Comparing** Moon phases. Explaining observations scientifically.	• **Observing** models and videos of the Moon orbiting Earth. • **Comparing** the movements of Earth and the Moon. • **Recording** findings using diagrams and charts. • **Interpreting evidence** to explain how the Moon moves relative to Earth.	
To investigate the phases of the Moon	• Moon phases occur because of the Moon's position relative to Earth and the Sun. • The Moon's appearance changes in a repeating cycle. • Different phases include new moon, crescent, half moon and full moon. • The Moon completes a cycle approximately every month.	Sequencing Moon phases. Modelling Moon phases. **Recording** observations over time. Explaining lunar changes scientifically.	• **Asking** scientific questions about why the Moon appears to change shape. • Making **predictions** using models and observations. • **Observing** Moon phases carefully over time. • **Recording** findings using diagrams, charts and Moon journals. • **Interpreting patterns** in Moon phases. • Explaining how the Moon's orbit causes the phases we see.	
To understand why we experience seasons	• Earth is tilted on its axis. • As Earth orbits the Sun, different parts receive different amounts of sunlight. • Seasons are caused by Earth's tilt and orbit. • Day length changes throughout the year.	**Interpreting** seasonal diagrams. **Comparing** seasonal changes. Using models to explain seasons. Explaining scientific ideas clearly.	• **Asking** scientific questions about seasonal change. • **Observing** models of Earth's tilt and orbit carefully. • **Comparing** how sunlight reaches different parts of Earth. • **Recording** findings using diagrams and explanation charts. • **Interpreting evidence** to explain why seasons occur.	
To investigate how scientific ideas about space have changed over time	• Scientific understanding of space has changed over time. • New evidence and technology improve scientific knowledge. • Scientists such as Galileo and Copernicus contributed to space science. • Space exploration continues to develop understanding of the universe.	**Researching** historical scientific ideas. **Comparing** past and present theories. **Interpreting evidence** from secondary sources. Presenting scientific explanations clearly.	• **Asking** scientific questions about the development of space science. • **Observing** and **comparing** historical scientific models. • **Researching** key scientists and discoveries using secondary sources. • **Recording** findings using timelines, notes and comparison charts. • **Interpreting evidence** to explain how scientific understanding changes over time. • **Evaluating** how new evidence can change scientific ideas.	

Year Five- Forces

National Curriculum Statements:
• 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.

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)

Possible misconceptions	Assessment opportunities:
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.	• **Investigation activities** – Children investigate air resistance, water resistance and friction • **Comparison activities** – Children compare how different mechanisms reduce effort • **Observation activities** – Children observe the effects of gravity and balanced and unbalanced forces • **Measurement activities** – Children measure how forces affect movement and speed • **Discussion activities** – Children explain how forces affect movement • **Recording activities** – Children record findings using tables, charts, graphs and labelled diagrams

Forces
Enquiry Question: How do forces affect movement?

Lesson objectives	Knowledge	Skills	Working Scientifically	Vocabulary
To understand the force of gravity	• Gravity is a force that pulls objects towards the Earth. • Unsupported objects fall because of gravity. • Gravity acts between the Earth and objects. • Gravity affects everything on Earth. • The greater the mass of an object, the greater the gravitational pull. • Isaac Newton explained that gravity is a force that pulls objects towards the Earth.	**Observing** the effects of gravity. **Comparing** how objects move and fall. **Interpreting** diagrams and models. Explaining gravity using scientific vocabulary.	• **Asking** scientific questions about gravity and falling objects. • **Observing** how gravity affects objects on Earth. • **Comparing** how objects move under the force of gravity. • **Recording** findings using diagrams, tables and scientific vocabulary. • **Interpreting evidence** to explain how gravity acts as a force pulling objects towards Earth.	gravity friction air resistance water resistance mechanism lever pulley gear force load effort Isaac Newton mass weight push pull balanced forces unbalanced forces motion surface resistance streamlined accelerate decelerate
To learn about Sir Isaac Newton and his contribution to science	• Sir Isaac Newton was an important scientist and mathematician. • Newton developed theories about gravity and motion. • Scientific ideas develop over time through observation and evidence. • Scientists share discoveries which help improve understanding of the world. • Newton's discoveries still influence science today.	**Researching** scientific discoveries. **Interpreting** historical scientific evidence. Explaining how scientific ideas develop. Presenting scientific information clearly.	• **Asking** scientific questions about scientific discoveries and forces. • **Observing** and **interpreting** historical scientific evidence. • **Researching** Sir Isaac Newton using secondary sources. • **Recording** findings using timelines, notes and diagrams. • **Interpreting evidence** to explain Newton's contribution to understanding gravity and forces. • **Evaluating** how scientific ideas develop over time.	
To investigate air resistance	• Air resistance is a force that acts against movement through air. • Air resistance slows moving objects down. • The shape and surface area of an object affect air resistance. • Parachutes increase air resistance	Planning and carrying out fair **investigations**. **Comparing** how objects move through air. Measuring and **Recording** results. **Identifying patterns** in findings.	• **Asking** scientific questions about air resistance. • Making **predictions** before **investigations**. • Planning and carrying out fair **investigations** using falling objects or parachutes. • **Observing** and measuring movement carefully. • **Recording** findings using tables, charts and graphs. • **Interpreting results** to explain how air resistance affects movement. • **Evaluating investigations** and suggesting improvements.	
To investigate water resistance	• Water resistance is a force that acts against movement through water. • Water resistance slows objects moving through water.	Investigating movement through water. **Comparing** different shapes and materials. **Recording** results accurately.	• **Asking** scientific questions about water resistance. • Making **predictions** before **investigations**.	

	• Shape affects how easily objects move through water. • Streamlined objects experience less water resistance.	Explaining findings scientifically.	• Planning and carrying out comparative **investigations** fairly. • **Observing** and measuring how objects move through water. • **Recording** findings using tables and charts. • **Interpreting evidence** to explain how water resistance slows movement.	
To investigate friction	• Friction is a force between two surfaces. • Friction slows movement. • Rough surfaces create more friction than smooth surfaces. • Friction can be helpful or unhelpful	**Comparing** movement on different surfaces. Measuring distances travelled. **Recording** results systematically. Explaining **patterns using evidence**.	• **Asking** scientific questions about friction. • Making **predictions** about how surfaces affect movement. • Planning and carrying out comparative **investigations** using different surfaces. • **Observing** and measuring movement carefully. • **Recording** findings using tables, charts and graphs. • **Interpreting results** to explain how friction affects motion.	
To understand mechanisms: levers, pulleys and gears	• Mechanisms help make work easier. • Levers reduce the force needed to move objects. • Pulleys change the direction of force. • Gears transfer movement and force. • Mechanisms are used in many everyday machines.	Investigating simple mechanisms. **Observing** how mechanisms affect movement. **Comparing** different mechanisms. Explaining how mechanisms work.	• **Asking** scientific questions about mechanisms and movement. • **Observing** different mechanisms carefully. • **Comparing** how levers, pulleys and gears work. • **Recording** findings using labelled diagrams and scientific vocabulary. • **Interpreting evidence** to explain how mechanisms make work easier.	
To investigate how mechanisms reduce the effort needed to move objects	• Mechanisms can increase force or speed. • Different mechanisms are suited to different tasks. • Engineers use mechanisms to solve problems. • Forces can be transferred through mechanical systems.	Designing and testing mechanisms. **Comparing** effectiveness of mechanisms. **Recording** and analysing results. Explaining conclusions **using evidence**.	• **Asking** scientific questions about force and effort. • Making **predictions** before **investigations**. • Planning and carrying out comparative **investigations** using mechanisms. • **Observing** and measuring effort needed to move objects. • **Recording** findings using tables, charts and diagrams. • **Interpreting evidence** to explain how mechanisms reduce effort. • **Evaluating** the effectiveness of different mechanisms	

Year Six- Living Things and their Habitats

National Curriculum Statements:
• 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.

Prior Learning:	Future Learning:
• **Year 4:** • 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. **Year 5:** • 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	**KS3:** • Differences between species

Possible misconceptions	Assessment opportunities:
Some children may think: • all micro-organisms are harmful • mushrooms are plants	• **Labelling activities** – Children label parts of the circulatory system and identify the functions of the heart, blood vessels and blood • **Investigation activities** – Children investigate the impact of exercise on pulse rate and body function • **Comparison activities** – Children compare healthy and unhealthy lifestyles and their effects on the body • **Observation activities** – Children observe how nutrients and water are transported within the body • **Discussion activities** – Children explain how lifestyle choices affect the human body • **Recording activities** – Children record findings using tables, charts, graphs and scientific explanations

Living things and their habitats				
Enquiry Question: How do scientists classify living things?				
Lesson objectives	**Knowledge**	**Skills**	**Working Scientifically**	**Vocabulary**
To understand how living things	• Living things can be classified based on shared characteristics.	**Observing similarities and differences** between organisms.	• **Asking** scientific questions about **similarities and differences** between organisms.	classification taxonomy

are classified into broad groups	• Scientists group organisms to help identify and study them. • Broad groups include vertebrates, invertebrates, plants, fungi and microorganisms. • Classification systems are based on observable features.	Grouping organisms using characteristics. Explaining reasons for classifications. Using scientific vocabulary accurately.	• **Observing** characteristics carefully using images and specimens. • **Recording** findings using classification tables and diagrams. • **Interpreting evidence** to justify classifications.	organism vertebrate invertebrate microorganism bacteria fungi protist species kingdom phylum class order family genus Carl Linnaeus Linnaean system
To understand the kingdoms of life	• Scientists classify living things into kingdoms. • The five commonly taught kingdoms are animals, plants, fungi, protists and bacteria. • Organisms within kingdoms share important characteristics. • Some organisms are microscopic	**Comparing** characteristics of kingdoms. **Sorting** organisms into kingdoms. **Interpreting** scientific information. **Explaining why** organisms belong to certain groups.	• **Asking** questions about how organisms are grouped. • **Observing** characteristics using images, videos and secondary sources. • **Recording** information using comparison charts. • **Interpreting patterns** between different kingdoms.	
To understand the Linnaean classification system	• Carl Linnaeus developed a system for classifying organisms. • Organisms are grouped into increasingly specific categories. • Classification includes kingdom, phylum, class, order, family, genus and species. • Scientific names help scientists identify organisms accurately worldwide.	Using classification systems. **Comparing** organisms based on characteristics. **Interpreting** classification charts. Using scientific vocabulary correctly.	• **Asking** scientific questions about how scientists organise living things. • **Observing similarities and differences** between species. • **Recording** findings using classification diagrams. • **Interpreting evidence** to place organisms into categories.	
To identify the characteristics of microorganisms	• Microorganisms are tiny living things that are often invisible to the naked eye. • Types of microorganisms include bacteria, fungi and some protists. • Some microorganisms are useful while others can cause disease. • Microorganisms live in many different environments.	**Comparing** different microorganisms. **Observing** images/models of microorganisms. Explaining how microorganisms affect humans and environments. **Recording** observations scientifically.	• **Asking** scientific questions about microorganisms. • **Observing** evidence from images, videos and secondary sources. • **Recording** findings using labelled diagrams and tables. • **Interpreting information** about helpful and harmful microorganisms.	
To investigate asexual reproduction through spore dispersal	• Some organisms reproduce asexually. • Fungi reproduce using spores. • Spores can be dispersed by air, water or animals.	**Observing** mould growth and spore **patterns**. **Comparing** sexual and asexual reproduction. **Recording** observations over time.	• **Asking** scientific questions about fungal growth. • Planning and carrying out an investigation **Observing** mould growth safely. • **Observing** and measuring changes over time.	

	• Asexual reproduction produces genetically similar offspring.	Explaining how spore dispersal helps survival.	• **Recording** findings using tables and labelled diagrams. • **Interpreting results** and **evaluating patterns** observed.	
To classify and describe a living organism	• Organisms can be classified using observable characteristics. • Scientific classification relies on evidence. • Living things may share some characteristics but differ in others. • Classification systems help scientists communicate clearly.	Identifying characteristics of organisms. Using classification systems independently. Justifying classifications **using evidence**. Presenting scientific conclusions clearly.	• **Asking** scientific questions about unknown organisms. • **Observing** features carefully using images, specimens or videos. • **Recording** findings using classification charts and scientific diagrams. • **Interpreting evidence** to justify conclusions. • **Evaluating** classifications and suggesting improvements.	

Year Six- Animals Including Humans

National Curriculum Statements:
• 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

Prior Learning:	Future Learning:
Year 2: • Describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene **Year 3:** • 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 **Year 4:** • 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	KS3: • The consequences of imbalances in the diet, including obesity, starvation and deficiency diseases. • The effects of recreational drugs (including substance misuse) on • behaviour, health and life processes. • The structure and functions of the gas exchange system in humans, including adaptations to function. • The mechanism of breathing to move air in and out of the lungs • The impact of exercise, asthma and smoking on the human gas exchange system.

Possible misconceptions	Assessment opportunities:
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	• **Classification activities** – Children classify living things using the Linnaean system • **Observation activities** – Children observe and compare characteristics of different organisms and microorganisms • **Investigation activities** – Children use and create classification keys to identify organisms • **Comparison activities** – Children compare organisms based on **similarities and differences** • **Research activities** – Children research Carl Linnaeus and the development of taxonomy • **Recording activities** – Children record findings using classification charts, branching diagrams and scientific vocabulary

Animals Including Humans				
Enquiry Question: How does the circulatory system keep the human body alive and healthy?				
Lesson objectives	**Knowledge**	**Skills**	**Working Scientifically**	**Vocabulary**
To identify the main parts of the	• The circulatory system transports substances around the body.	Identifying parts of the circulatory system. Labelling diagrams accurately.	• **Asking** questions about how substances travel around the body.	circulatory system heart blood vessels

human circulatory system	• The main parts of the circulatory system are the heart, blood and blood vessels. • Blood vessels include arteries, veins and capillaries. • The circulatory system works with other body systems.	Describing how the circulatory system is organised. Using scientific vocabulary correctly.	• **Observing** and identifying structures within the circulatory system using diagrams and models. • **Recording** findings using labelled scientific diagrams. • **Interpreting information** from scientific models and secondary sources.	arteries veins capillaries oxygenated blood deoxygenated blood nutrients respiration pulse exercise lifestyle drugs water transport healthy diet
To understand the function of the heart	• The heart is a muscle that pumps blood around the body. • The heart beats continuously to keep blood moving. • Blood carries oxygen and nutrients to body cells. • Exercise increases heart rate because muscles need more oxygen.	Measuring pulse rate. **Observing** changes before and after exercise. **Recording** results accurately. Explaining the role of the heart using scientific vocabulary.	• **Asking** questions about how exercise affects the heart. • Planning a comparative investigation measuring pulse rates before and after exercise. • **Observing** and measuring pulse rate accurately over time. • **Recording** results using tables and line graphs. • **Interpreting results** to identify **patterns** between exercise and heart rate.	
To understand the function of blood vessels and blood	• Arteries carry blood away from the heart. • Veins carry blood back to the heart. • Capillaries are tiny blood vessels where substances are exchanged. • Blood transports oxygen, nutrients, water and waste products. • Blood contains red blood cells, white blood cells, platelets and plasma.	**Comparing** types of blood vessels. **Interpreting** diagrams and models. Explaining the role of blood components. **Recording** information clearly.	• **Asking** questions about how blood transports substances. • **Observing** models and diagrams of blood vessels and blood components. • **Recording** information using comparison tables and annotated diagrams. • **Interpreting** findings to explain how blood vessels are adapted for their functions.	
To understand how nutrients and water are transported around the body	• Nutrients from digested food enter the bloodstream. • Water is transported around the body by blood. • The circulatory system works closely with the digestive system.	Sequencing nutrient transport processes. **Interpreting** diagrams of body systems. Explaining how body systems work together. Using scientific vocabulary accurately.	• **Asking** questions about how body systems work together. • **Observing** and **interpreting** models showing nutrient transport.	

	• Cells need nutrients and water to function properly. • Rosalind Franklin's work helped scientists understand the structure of DNA, which carries information about how our bodies grow and function.		• Recording explanations using flow diagrams and scientific vocabulary. • Interpreting evidence from secondary sources to explain transport processes.	
To investigate the impact on exercise on the body	• Exercise strengthens the heart and muscles. • Physical activity increases heart rate and breathing rate. • Exercise helps improve circulation and overall health. • Recovery rate can indicate fitness levels.	Planning and carrying out **investigations**. Measuring pulse and recovery rates. Recording data in tables and graphs. **Interpreting results** and drawing conclusions.	• **Asking** scientific questions about fitness and recovery rate. • Planning and carrying out a fair test investigating the effect of exercise on pulse rate. • Measuring pulse and recovery times accurately using timers. • Recording data using tables, bar charts and line graphs. • **Interpreting results** and evaluating reliability of the investigation.	
To explore how diet affects the human body	• A balanced diet provides nutrients needed for health. • Too much fat, sugar or salt can negatively affect the body. • Poor diet can increase the risk of disease. • Hydration is important for body function.	Analysing diets and nutritional information. Comparing healthy and unhealthy choices. **Interpreting** food labels and data. Explaining impacts on body systems.	• **Asking** questions about how diet affects body systems. • **Interpreting** nutritional information and scientific data. • Recording findings using charts and comparison tables. • **Interpreting patterns** between diet and health outcomes. • Evaluating lifestyle choices using scientific evidence.	
To investigate how drugs, alcohol and lifestyle affect the body	• Drugs, alcohol and smoking can affect body systems. • Some drugs are medicines that help the body when used correctly. • Lifestyle choices can impact physical and mental health. • Long-term unhealthy choices may damage organs and circulation.	Evaluating lifestyle choices **using evidence**. Comparing short-term and long-term effects. **Interpreting** scientific information. Presenting reasoned conclusions.	• **Asking** scientific questions about the effects of substances on the body. • Researching using reliable secondary sources. • Recording information using tables and presentations. • **Interpreting** scientific evidence and **Identifying patterns**.	

			• **Evaluating** the reliability of information and suggesting evidence-based conclusions.	

Year Six- Evolution and Inheritance

National Curriculum Statements:
• 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:
Year 2: • 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. • Notice that animals, including humans, have offspring which grow into adults. **Year 3:** • Explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal. • Describe in simple terms how fossils are formed when things that have lived are trapped within rock. (Y3 - Rocks) **Year 4:** • Recognise that environments can change and that this can sometimes pose dangers to living things. **Year 5:** • Describe the life process of reproduction in some plants and animals	**KS3:** • Heredity as the process by which genetic information is transmitted from one generation to the next. • 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. • The variation between species and between individuals of the same species means some organisms compete more successfully, which can drive natural selection. • 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.

Possible misconceptions	Assessment opportunities:
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	• **Observation activities** – Children observe fossils and identify evidence of changes over time • **Comparison activities** – Children compare inherited characteristics and variations within species • **Investigation activities** – Children investigate how adaptations help living things survive in different environments • **Research activities** – Children research Charles Darwin and the theory of evolution • **Discussion activities** – Children explain how adaptation may lead to evolution • Recording **activities** – Children record findings using diagrams, charts and scientific explanations

Evolution and Inheritance				
Enquiry Question: How have living things changed and adapted over time?				
Lesson objectives	**Knowledge**	**Skills**	**Working Scientifically**	**Vocabulary**
• To understand how offspring vary and are not identical to their parents	• Offspring inherit characteristics from their parents. • Inherited traits are passed from one generation to the next. • Offspring are similar to parents but are not identical. • Variation occurs within a species. • Some characteristics are inherited and some are influenced by environment.	**Comparing** inherited characteristics. **Observing** variation within species. **Identifying similarities and differences**. Explaining inheritance using scientific vocabulary.	• **Asking** scientific questions about inherited traits. • **Observing similarities and differences** carefully. • **Recording** findings using tables and classification charts. • **Interpreting patterns** within families and species.	evolution inheritance adaptation variation offspring fossil natural selection environment survival extinct characteristics species traits mutation Charles Darwin
• To understand how animals are adapted to their environments	• Adaptations are features that help organisms survive. • Adaptations may be structural, behavioural or functional. • Animals adapt to suit their habitats and lifestyles. • Adaptations increase chances of survival and reproduction.	Identifying animal adaptations. **Comparing** organisms from different environments. Explaining how adaptations support survival. Using scientific evidence to justify ideas.	• **Asking** questions about survival and adaptation. • **Observing** animal features using images and secondary sources. • **Recording** findings using comparison tables. • **Interpreting evidence** to explain adaptation advantages.	
• To understand how plants are adapted to their environments	• Plants have adaptations that help them survive in specific environments. • Adaptations may help plants obtain water, sunlight or protection. • Different environments require different plant adaptations. • Adaptation supports survival and reproduction.	**Comparing** plant adaptations. **Observing** structural features of plants. Explaining how environments affect plant growth. **Recording** scientific observations accurately.	• **Asking** scientific questions about plant survival. • **Observing** plant structures carefully. • **Recording** findings using labelled diagrams and tables. • **Interpreting patterns** between environment and adaptation.	
• To understand how fossils provide evidence for evolution	• Fossils provide evidence of living things from millions of years ago. • Fossils show that living things have changed over time. • Some extinct organisms were different from living organisms today. • Fossils help scientists understand evolutionary change.	**Observing** fossil evidence. **Comparing** extinct and living organisms. **Interpreting** scientific evidence. Explaining conclusions using scientific vocabulary.	• **Asking** scientific questions about extinct organisms. • **Observing** fossil evidence carefully. • **Recording** findings using annotated diagrams and comparison tables. • **Interpreting evidence** to explain change over time.	
• To understand Charles Darwin's	• Charles Darwin developed the theory of evolution by natural selection.	Explaining natural selection.	• **Asking** scientific questions about survival and adaptation.	

theory of evolution by natural selection	• Organisms with helpful adaptations are more likely to survive and reproduce. • Over many generations, advantageous traits become more common. • Evolution occurs gradually over long periods of time. • Darwin developed his ideas through observation and evidence gathering.	**Interpreting evidence** and observations. **Comparing** organisms and adaptations. Using scientific vocabulary accurately.	• **Observing** evidence from secondary sources and case studies. • **Recording** findings using flow diagrams and scientific explanations. • **Interpreting evidence** to explain evolutionary change. • **Evaluating** how scientific ideas develop over time.	
• To explore human evolution	• Humans evolved over millions of years. • Early human ancestors had adaptations suited to their environments. • Fossil evidence helps scientists understand human evolution. • Humans continue to vary within the species today.	**Comparing** early humans with modern humans. **Interpreting** fossil and scientific evidence. Explaining how humans have adapted over time. Using scientific vocabulary confidently.	• **Asking** scientific questions about human evolution. • **Observing** evidence from fossils and reconstructions. • **Recording** findings using timelines and diagrams. • **Interpreting** scientific evidence to draw conclusions. • **Evaluating** how scientific understanding changes with new evidence.	

Year Six- Light

National Curriculum Statements:
• 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:
Year 3: • 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 **Year 5:** • 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	KS3: • The **similarities and differences** between light waves and waves in matter. • Light waves travelling through a vacuum; speed of light. • The transmission of light through materials: absorption, diffuse scattering and specular reflection at a surface. • 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. • Light transferring energy from source to absorber leading to chemical and electrical effects; photo-sensitive material in the retina and in cameras. • Colours and the different frequencies of light, white light and prisms (qualitative only); differential colour effects in absorption and diffuse reflection.

Possible misconceptions	Assessment opportunities:
Some children may think: • we see objects because light travels from our eyes to the object	• **Investigation activities** – Children investigate how light travels and how shadows are formed • **Observation activities** – Children observe reflection, refraction and how light enters the eye • **Comparison activities** – Children compare reflective and transparent materials • **Prediction activities** – Children predict how shadows will change based on light source position • **Discussion activities** – Children explain how light helps us see objects • **Drawing and labelling** – Children draw and label light rays, shadows and reflective surfaces accurately

Light				
Enquiry Question: How does light travel and help us see the world around us?				
Lesson objectives	**Knowledge**	**Skills**	**Working Scientifically**	**Vocabulary**
To understand how light travels	• Light travels in straight lines. • Light travels extremely quickly. • Light rays are used to represent the direction light travels. • Objects can block the path of light.	**Observing** how light behaves. Using diagrams to represent light rays. Explaining observations scientifically. Using scientific vocabulary accurately.	• **Asking** scientific questions about how light travels. • Planning **simple investigations** using torches and obstacles. • **Observing** light paths carefully. • **Recording** findings using labelled ray diagrams. • **Interpreting evidence** to explain light movement.	reflection refraction light ray straight line shadow opaque transparent translucent retina pupil spectrum angle mirror periscope
To understand how light reflects into our eyes	• We see objects because light reflects from them into our eyes. • Some objects produce light while others reflect it. • Smooth surfaces reflect light more clearly. • Reflection follows predictable paths. • Patricia Bath invented equipment that improved eye surgery and helped people see more clearly.	**Observing** reflective surfaces. Drawing simple ray diagrams. **Comparing** reflective and non-reflective materials. Explaining how reflection helps us see.	• **Asking** questions about reflection. • **Observing** reflections using mirrors and light sources. • **Recording** findings using annotated diagrams. • **Interpreting evidence** to explain how reflected light enters the eye.	
To explain how humans see objects	• Light travels from a source to an object and then into the eye. • The eye detects light reflected from objects. • Without light, objects cannot be seen. • Transparent, translucent and opaque materials affect how light travels.	Explaining how sight works. **Comparing** how materials interact with light. Drawing scientific diagrams. Using scientific vocabulary accurately.	• **Asking** scientific questions about sight and visibility. • **Observing** how light behaves with different materials. • **Recording** results using tables and ray diagrams. • **Interpreting patterns** in how materials affect light.	
To investigate how shadows are formed	• Shadows form when opaque objects block light. • Shadows are created because light travels in straight lines. • Transparent materials create little or no shadow. • The position of the light source affects the shadow.	Investigating shadow formation. **Observing** how light is blocked. Measuring shadow size and direction. Explaining observations scientifically.	• **Asking** questions about shadow formation. • Planning comparative **investigations**. • Measuring shadows accurately. • **Recording** findings using tables and diagrams. • **Interpreting patterns** between light position and shadows.	

To explain why shadows have the same shape as the object casting them	• Shadows have the same outline shape as the object blocking the light. • Light travelling in straight lines creates clear shadow shapes. • Changes in light position can affect shadow size but not overall shape. • Opaque objects create the clearest shadows.	**Comparing** objects and their shadows. Predicting shadow shapes. Explaining shadow formation using ray diagrams. **Using evidence** to support conclusions.	• **Asking** scientific questions about shadow shape. • Planning **investigations** using different objects and light positions. • **Observing** and measuring shadows carefully. • **Recording** findings using labelled diagrams and tables. • **Interpreting results** to explain shadow formation.	
To investigate how light behaves in different situations	• Light can be reflected, blocked or absorbed. • Materials affect how light travels. • Scientific understanding of light explains many everyday phenomena. • Light behaviour can be predicted using scientific models.	Planning **investigations** independently. Using scientific equipment safely. Drawing and **interpreting** ray diagrams. Explaining scientific observations clearly.	• **Asking** testable scientific questions. • Planning and carrying out fair **investigations**. • **Observing** and measuring accurately. • **Recording** results using graphs, diagrams and tables. • **Interpreting evidence** and **evaluating investigations**.	

Year Six- Electricity

National Curriculum Statements:
• • 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.

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)

Possible misconceptions	Assessment opportunities:
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	• **Circuit activities** – Children construct and test circuits using recognised circuit symbols • **Investigation activities** – Children investigate how voltage affects brightness and volume in a circuit • **Comparison activities** – Children compare how components function in different circuits • **Observation activities** – Children observe how switches and components affect current flow • **Discussion activities** – Children explain how electrical circuits work and why components behave differently • **Drawing and labelling** – Children draw and l

Electricity				
Enquiry Question: How can changing a circuit affect how electrical components work?				
Lesson objectives	**Knowledge**	**Skills**	**Working Scientifically**	**Vocabulary**

To understand the role of components within a circuit	• Different electrical components have specific functions within a circuit. • Cells provide electrical energy. • Wires allow electricity to flow around a circuit. • Bulbs transfer electrical energy into light. • Buzzers transfer electrical energy into sound. • Switches control whether a circuit is complete or incomplete.	Identifying and explaining component functions. Constructing complete circuits accurately. **Comparing** how components behave in different circuits. Using scientific vocabulary confidently.	• **Asking** scientific questions about circuit behaviour. • **Observing** components carefully within working circuits. • **Recording** findings using labelled diagrams and scientific vocabulary. • **Interpreting evidence** to explain component functions.	circuit voltage cell battery current buzzer bulb motor switch conductor insulator resistance series circuit circuit symbol component brightness loudness
To understand and use recognised circuit symbols	• Scientists use recognised symbols to represent electrical components. • Circuit diagrams allow scientists to communicate clearly. • Each electrical component has a specific symbol. • Circuit diagrams show how components are connected.	Identifying circuit symbols. Drawing accurate circuit diagrams. Matching symbols to real components. Explaining how diagrams represent working circuits.	• **Asking** scientific questions about how circuits are represented. • **Observing** real circuits and **comparing** them to diagrams. • **Recording** findings using recognised scientific symbols. • **Interpreting** circuit diagrams accurately.	
To investigate how the number of cells affects a circuit	• Cells provide energy to electrical circuits. • Increasing the number of cells increases the energy supplied. • More cells can make bulbs brighter. • More cells can make buzzers louder.	Building comparative circuits. **Observing** changes in component behaviour. Measuring and **comparing** results. Explaining **patterns** scientifically.	• **Asking** scientific questions about energy in circuits. • Planning fair comparative **investigations**. • **Observing** and measuring changes carefully. • **Recording** findings using tables and graphs. • **Interpreting patterns** in results.	
To investigate how voltage affects components in a circuit	• Voltage affects how components function. • Higher voltage provides more electrical energy. • Different components respond differently to voltage changes. • Too much voltage may damage electrical components.	**Comparing** circuits with different voltages. Predicting outcomes. Measuring and **Recording** observations accurately. Explaining scientific findings **using evidence**.	• **Asking** testable scientific questions. • Planning and carrying out fair **investigations**. • **Observing** and measuring accurately. • **Recording** results using tables and charts. • **Interpreting evidence** and **evaluating** findings.	
To compare and explain variations in bulb brightness	• Bulb brightness depends on the amount of electrical energy transferred. • More cells can increase bulb brightness. • Adding additional bulbs may reduce brightness.	**Comparing** brightness in different circuits. **Recording** scientific observations. Drawing conclusions from evidence. Explaining variations scientifically.	• **Asking** scientific questions about bulb brightness. • Planning comparative **investigations**. • **Observing** changes carefully. • **Recording** findings using tables and graphs.	

	• Circuit arrangement affects how bulbs function. • Edith Clarke designed electrical systems that improved how electricity is used safely and efficiently.		• **Interpreting patterns** and explaining results.	
To compare and explain variations in buzzer volume	• Buzzer volume depends on the amount of energy supplied. • Voltage can affect sound output. • Circuit design changes how buzzers function. • Components respond differently in different circuits.	Investigating sound changes in circuits. **Comparing** circuit arrangements. Measuring and **Recording** observations. Explaining findings using scientific vocabulary.	• **Asking** scientific questions about sound in circuits. • Planning fair **investigations**. • **Observing** and measuring carefully. • **Recording** results systematically. • **Interpreting evidence** to explain findings.	
To investigate how switches affect electrical circuits	• Switches control the flow of electricity. • Opening a switch breaks a circuit. • Closing a switch completes a circuit. • Switch placement can affect circuit behaviour.	Constructing circuits with switches. Testing circuit behaviour. Drawing circuit diagrams using recognised symbols. Explaining how switches work	• **Asking** scientific questions about switches and circuit control. • Planning **investigations** using electrical equipment safely. • **Observing** changes in circuits carefully. • **Recording** findings using circuit diagrams and tables. • **Interpreting evidence** to explain outcomes.	
To design and evaluate a working electrical circuit	• Circuit design affects how components function. • Electrical systems should work safely and effectively. • Engineers test and improve electrical designs. • Scientific diagrams help communicate electrical systems clearly.	Designing electrical circuits independently. Selecting suitable components. Drawing accurate circuit diagrams. Testing and improving designs. Explaining design choices scientifically.	• **Asking** scientific questions to solve problems. • Planning **investigations** and selecting equipment appropriately. • **Observing** and measuring component performance. • **Recording** findings using diagrams, tables and graphs. • **Interpreting evidence** and **evaluating** effectiveness of designs.	