Dr Radcliffe's CE Primary School

Curriculum Information

Science

OFSTED Target - While some pupils already achieve exceptionally well, this is not consistently the case for pupils across the school. Leaders need to improve the depth and challenge of the curriculum further, so that pupils, including those with SEND, make excellent progress in the subjects they study.

Intent

At Dr Radcliffe's CE Primary School, we are passionate about instilling a love of science from an early age which will encourage continued curiosity and fascination. We want children to develop an interest in the world around them, and to learn to ask questions and solve problems using scientific methods. The teaching of science at our school aspires to create Scientists who challenge their own thinking and the thinking of others and so develop a persistent curiosity. Our curriculum is planned so that pupils progressively build on learnt scientific knowledge and skills. We want the children to experience as much practical 'hands on' science as possible and to realise its importance in everyday life. It is important to us that children learn about the significant work of famous scientists in the past, both men and women, to help inspire the next generation of budding scientists.

Implementation

We provide a broad curriculum, with a backbone provided by the National Curriculum, that is rich in cultural experiences and provides opportunities for children to develop spiritually, socially and morally. The acquisition of key scientific knowledge is an integral part of our science lessons. Knowledge organisers enable children to learn and retain the important, useful and powerful vocabulary and knowledge contained within each unit. The progression of skills for working scientifically are developed through the year groups and scientific enquiry skills are of key importance within lessons. Our Primary curriculum aims to familiarise pupils with all these types of enquiries so that by the end of Key stage 2 they are able to choose the most suitable enquiry type to answer questions. In Key stage 1, pupils are introduced to enquiry types as 'Super science skills' and are encouraged to reflect on which skills they have used to answer questions

Essential and correct knowledge is mapped by year group and builds year on year. Misconceptions are planned and addressed accordingly. In primary school, biology, physics, and chemistry are science subjects that help students develop an understanding of the natural world and the processes that occur within it. These are blocked in to science topics:

- animals (including humans),
- living things and their habitats,
- plants,
- materials,
- rocks,
- states of matter,

- electricity, earth and space,
- seasonal changes,
- sound,
- light,
- forces and magnets,
- evolution and inheritance.

Working scientifically skills are blocked in to ask questions:

- plan
- make observations,
- take measurements,
- gather and record data
- present findings
- answer questions and make conclusions
- evaluate.

Science enquiry skills are blocked into:

- identifying, classifying and grouping
- comparative and fair testing
- observing over time
- pattern seeking
- research using secondary sources

Children gain knowledge through experiment, practice and discussion. Scientific vocabulary is a focus in every lesson and essential knowledge is remembered by children working scientifically. Everyday materials and scientific equipment are used to solve science problems. Each block of learning includes an enquiry question to further enrich children's understanding of the scientific enquiry process. Teachers conduct assessment for learning during lesson time and adapt teaching as necessary.

At Dr Radcliffe's CE Primary School, teachers create a positive attitude to science learning within their classrooms and

reinforce an expectation that all children are capable of achieving high standards in science. We ensure that barriers to learning are removed to enable all children to engage across the curriculum. Learning is scaffolded, children are provided with opportunities to revisit their learning. Opportunities are provided for the children to research a topic or present something that they are interested in. Every lesson has a clear learning objective with scaffolded learning statements which act as clear challenge for the children. Tier 3 topic-based vocabulary is shared with the children to ensure they develop well.

Enriching experiences are planned to ignite the children's passion for science and help them envisage Science beyond the classroom e.g. National Science Week, STEM days. Science trips (e.g. Sutton Courtenay Environmental Centre, Science Oxford)

Impact

Progress and attainment are formally tracked to ensure they are working towards their end of year expectations. This is mainly seen through assessments, book and pupil voice. At the end of KS2, a judgement has to be made as to whether a child has met KS2 expectations. This is based on summative assessments on key knowledge, from the KS2 topics, and their working scientifically skills. Children enjoy their learning and achieve high academic standards. They are curious about the world and interested in finding out more, often extending their learning at home. Through the broad experiences they have engaged in, they have a growing awareness of the world beyond themselves and have a thirst for knowledge.

Recording

Science at Dr Radcliffe's is recorded in books. For the majority of lessons, learning is recorded in these books. This may be children's work or photographic evidence of working scientifically skills/enquiry skills.. However, in some instances, forms of learning may happen where recording in books is not possible or appropriate. Teacher, peer and self-assessment will be used to tick the depth of learning statements to record whether they have been achieved. These will be present for every lesson. Teachers will use their professional judgement to make this decision. Children will be given the opportunity to build their understanding and experiences through a variety of tasks that will allow them to show their Scientific knowledge, Working Scientifically skills and Enquiry Skills.

Assessment

Children will have the opportunity to answer key concept questions in a verbal and written format, which will give the teachers an excellent understanding of how well children have understood the taught knowledge and skills. After each science topic, teachers will make a summative assessment of whether the child is working towards the age-related expectation, at age related expectation or working at greater depth. To develop their awareness of their knowledge and learning, children will have the opportunity to self and peer assess against learning objectives and depth of learning statements. Many other formative assessment strategies are used, including conversations with the children and the 'products' seen as a result of their learning. Formative and summative assessment are used together by teachers to gain a good understanding of the knowledge the children have embedded. At the end of KS2 a teacher assessment will be made available stating if the child has met end-of Key Stage 2 Science or is working towards. This assessment is based on key KS2 knowledge facts, set out in the National Curriculum and evidence of their meeting KS2 objectives for Working Scientifically.

Year	Topic Name – Knowledge and Working Scientifically				
1	Everyday Materials	Seasonal Change	Animals including Humans **(The Human Body)**	Plants **(Describing the basic structure)**	
2	Animals including humans **(Needs for survival)**	Uses of Everyday Materials	**Plants** **(Understanding how they grow)**	Living things and their habitats **(Compare Living and Non-living)**	
3	Animals including humans **(Food and our bodies)**	Rocks and Soils	Magnets and Forces	Plants **(Parts of the plant and their functions)**	Light and Shadows
4	Animals including humans **(Teeth, Eating and Digestion)**	Electricity	States of Matter	Living Things and their Habitats **(Classification and Environmental Change)**	Sound
5	Properties of Materials and how they change	Forces	Earth and Space	Living things and their habitats **(Reproduction in animals and plants)**	Animals including Humans **(Changes due to development in age)**
6	Animals including Humans **(Circulatory system and Health)**	Living things and their habitats **(Classifying micro-organisms)**	Evolution & inheritance	Electricity & circuits	Light **(How does it travel?)**

CHEMISTRY **PHYSICS** **BIOLOGY**

Key ‘Working Scientifically’ running through the Curriculum, as stated in the National Curriculum

Ask Questions	Identify	Making Predictions	Performing tests
Observing and measuring	Recording data	Interpreting & communicating results	Evaluating

Ask Questions
Pupils in year 1 and 2 should explore the world around them and raise their own questions. Pupils should use the local environment throughout the year to explore and answer questions about plants growing in their habitat. In years 3 and 4 pupils should be given a range of scientific experiences to enable them to raise their own questions about the world around them. Pupils in years 5 and 6 should use their science experiences to: explore ideas and raise different kinds of questions
Identify
In years 1 and 2, pupils should become familiar with common names of flowers, examples of deciduous and evergreen trees, and plant structures (including leaves, flowers (blossom), petals, fruit, roots, bulb, seed, trunk, branches, stem). They should use simple features to compare objects, materials and living things and, with help, decide how to sort and group them. As they move into years 3 and 4, pupils should talk about criteria for grouping, sorting and classifying; and use simple keys. Pupils in years 5 and 6, use and develop keys and other information records to identify, classify and describe living things and materials.
Predict
In years 1 and 2, pupils should, with help, begin to think about what they think is going to happen. In years 3 and 4, pupils begin to acquire previously taught knowledge, to make more accurate predictions.
Performing tests
In years 1 and 2, pupils should carry out simple tests. Pupils in years 3 and 4, should start to make their own decisions about the most appropriate type of scientific enquiry they might use to answer questions; recognise when a simple fair test is necessary and help to decide how to set it up. Pupils in years 5 and 6, select and plan the most appropriate type of scientific enquiry to use to answer scientific questions; recognise when and how to set up comparative and fair tests and explain which variables need to be controlled and why.
Observe and Measure
In years 1 and 2, where possible, they should observe the growth of flowers and vegetables that they have planted. They might, observing closely, perhaps using magnifying glasses. They should have opportunities to observe changes over time. They should use simple measurements and equipment (for example, hand lenses, egg timers) to gather data. In years 3 and 4, should help to make decisions about what observations to make, how long to make them for and the type of simple equipment that might be used. They should learn how to use new equipment, such as data loggers, appropriately. Pupils in years 5 and 6, should make their own decisions about what observations to take and

what measurements to use and how long to make them for, and whether to repeat them; choose the most appropriate equipment to make measurements and explain how to use it accurately.
Recording
In years 1 and 2, pupils should record simple data. This progresses into years 3 and 4, where decide what data to collect to identify them. In years 3 and 4, should collect data from their own observations and measurements, using notes, simple tables and standard units, and help to make decisions about how to record and analyse this data tables and standard units, and help to make decisions about how to record and analyse this data. Pupils in years 5 and 6, should decide how to record data from a choice of familiar approaches,
Interpreting & communicating results
Pupils in years 1 and 2, should experience different types of scientific enquiries, including practical activities, and begin to recognise ways in which they might answer scientific questions. With guidance, they should begin to notice patterns and relationships. They should ask people questions and use simple secondary sources to find answers. In years 3 and 4, pupils should begin look for naturally occurring patterns and relationships. With help, pupils should look for changes, patterns, similarities and differences in their data in order to draw simple conclusions and answer questions. With support, they should identify new questions arising from the data, making predictions for new values within or beyond the data they have collected. Pupils in years 5 and 6, identify patterns that might be found in the natural environment. In years 5 and 6, look for different causal relationships in their data and identify evidence that refutes or supports their ideas. They should use their results to identify when further tests and observations might be needed; recognise which secondary sources will be most useful to research their ideas and begin to separate opinion from fact.
Evaluating
In years 1 and 2, pupils are taught to being to think about what they have learnt. In years 3 and 4, finding ways of improving what they have already done. They should also recognise when and how secondary sources might help them to answer questions that cannot be answered through practical investigations. Pupils should use relevant scientific language to discuss their ideas and communicate their findings in ways that are appropriate for different audiences. In years 5 and 6, pupils, should use relevant scientific language and illustrations to discuss, communicate and justify their scientific ideas and should talk about how scientific ideas have developed over time.

Enquiry Skills: (www.great science share.org)		Possible questions to ask
	Identification is the process of using observable differences to name something and classification is organising things into groups based on observations, features and characteristics. Some questions are answered by naming things and or sorting them into groups, To do this it might be necessary to carry out an observation over time test or use a secondary source as well.	*How are the trees in the local park the same or different? How can we group the food that we eat? Which species of trees are growing in the local park? Which materials are magnetic, and which are not? Can we use an identification key to name the rocks in our collection? How can we group the invertebrates we have identified on the school grounds?*
	Pupils identify the effect of changing one variable on another whilst attempting to keep other variables constant. They are useful for gathering data that might inform predictions and further tests. In comparative tests pupils compare one event with another and identify different outcomes. With fair tests pupils look to identify a causal relationship between two variables.	*Which is the most reflective material? What kind of sponge will soak up the most water? Do all types of sugar dissolve at the same rate? Does the size of the parachute affect the speed it falls to the ground? How does voltage affect the brightness of a lamp? How does the amount of salt added to water affect the temperature that it freezes?*
	Pupils identify and measure events and changes in living things, materials and physical processes or events. These observations may take place over time spans of minutes or hours up to several weeks or months.	*What changes occur to a bird chick after it hatches? How do the colour of leaves change through the seasons? How does the volume of water in a container on the windowsill change with time? How does the height of our cress plants change with time? How does my shadow change over the day? How does the Moon appear to change over a month?*
	Pupils make observations and measure to explore natural events where there are variables that they can't easily control. They seek to identify patterns in the measurements, which may lead to other investigations in an effort to try to explain why a particular pattern occurred.	*Do all flowers have the same number of petals? Do woodlice prefer dark or light places to live? How much does your heart rate change when you do different exercises? Do all stretchy materials stretch in the same way? Are the oldest children in our school the tallest? Do older people have better hearing*?
	Pupils use a range of secondary sources (books, websites, articles, people, videos etc.) to gather evidence to answer questions. They look for patterns in the information they collect, evaluating the reliability and trustworthiness of the evidence they collect when drawing conclusion.	*How have some animals adapted to live in water? Which species of animals live in Africa and how do they compare to the animals native to the UK? How far away is the closest star? How have our ideas about the Solar System changed over time? Are microorganisms always harmful? What are microplastics and why are they harming the planet?*

Science Knowledge, Skills and Vocabulary Progression

(include differentiation, including for LA and HA)

Year 1

EVERYDAY MATERIALS

KNOWLEDGE & UNDERSTANDING

- 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
• Use all their senses in hands-on exploration of natural materials. (Early Years - Materials, including changing materials) • Explore collections of materials with similar and/or different properties. (Early Years - Materials, including changing materials) • Talk about the differences between materials and changes they notice. (Early Years - Materials, including changing materials)	• Identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses. (Y2 - Uses of everyday materials) • Find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching. (Y2 - Uses of everyday materials)

Common Misconceptions	Vocabulary	Enquiry Skills
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.	**Tier 1:** object, hard, soft, shiny, dull, stretchy, bendy, see-through, wood, metal, water, plastic, rock, glass, brick, paper, cardboard, fabric, rubber **Tier 2:** material, properties, stiff, rough, smooth, recycle, waste **Tier 3:** transparent, opaque, waterproof, absorbent	   

ASSESSMENT STATEMENTS		
WORKING TOWARDS	**WORKING AT EXPECTED LEVEL**	**WORKING AT GREATER DEPTH**
• Identify and name everyday materials. • Describe simple properties of everyday materials. • Observe closely, sort objects 2 ways.	• Distinguish between the object and the material it is made from. • Make a prediction. • Perform simple tests • Use their observations to answer simple questions. • Sort objects 3 ways.	• Describe and compare the properties of everyday materials. • Make a prediction and suggest a reason. • Suggest how a simple test could be made fair. • Use their observations, ideas and experiences to ask and answer simple questions. • Explain an outcome and suggest reasons for it.

SEASONAL CHANGES

KNOWLEDGE & UNDERSTANDING

- Observe changes across the four seasons.
- Observe and describe weather associated with the seasons and how day length varies.

Prior Learning	Future Learning
• Understand the key features of the life cycle of a plant and an animal. (Early Years – Plants & Animals, excluding humans) • Explore the natural world around them. (Reception – Seasonal changes) • Describe what they see, hear and feel whilst outside. (Reception – Seasonal changes) • Understand the effect of changing seasons on the natural world around them. (Reception – Seasonal changes)	• Recognise that light from the sun can be dangerous and that there are ways to protect their eyes. (Y3 - Light) • Use the idea of the Earth's rotation to explain day and night and the apparent movement of the Sun across the sky. (Y5 - Earth and space) • The seasons and the Earth's tilt, day length at different times of year, in different hemispheres. (KS3)

Common Misconceptions	Vocabulary	Enquiry Skills
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.	**Tier 1:** cloudy, cold, hot, month, rain, snow, sun, thunder and lightning, warm, wind **Tier 2:** autumn, daylight, nature, seasons, spring, summer, winter, temperature, thermometer	

	Tier 3: weather, hail, sleet, fog, seasonal changes, day length	

ASSESSMENT STATEMENTS		
WORKING TOWARDS	**WORKING AT EXPECTED LEVEL**	**WORKING AT GREATER DEPTH**
• Name the four seasons. • Name different types of weather. • Make observations about the weather. • Describe the weather associated with each season. • Collect and record simple data. • Make simple observations about changes across the seasons.	• Interpret simple data. • Name an event or occasion which happens in each season. • Describe how day length varies between two seasons. • Make a more detailed comparison between two seasons.	• Interpret and identify patterns in simple data and begin to suggest explanations for this. • Explain seasonal changes across the four seasons. • Describe how day length varies across the four seasons. • Make comparisons across the four seasons.

ANIMALS INCLUING HUMANS – The Human Body

KNOWLEDGE & UNDERSTANDING

- 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
• Use all their senses in hands-on exploration of natural materials. (Early Years - Humans) • Name and describe people who are familiar to them. (Reception - Humans)	• Describe how animals obtain their food from plants and other animals, using the idea of a simple food chain, and identify and name different sources of food. (Y2 - Living things and their habitats) • Describe how living things are classified into broad groups according to common observable characteristics and based on similarities and differences, including microorganisms, plants and animals. (Y6 - Living things and their habitats) • Give reasons for classifying plants and animals based on specific characteristics. (Y6 - Living things and their habitats)

Common Misconceptions	Vocabulary	Enquiry Skills
Some children may think: • only four-legged mammals, such as pets, are animals • humans are not animals	**Tier 1:** head, body, eyes, ears, mouth, teeth, leg, tail, wing, feathers, fur, beak, names of	

• insects are not animals • all 'bugs' or 'creepy crawlies', such as spiders, are part of the insect group • amphibians and reptiles are the same	animals experienced first-hand from each vertebrate group, parts of the body including those within the school's RSE policy, touch, see, smell, taste, hear, fingers, skin, eyes, nose, ear, tongue **Tier 2:** claw, fin, scales, hooves **Tier 3:** senses, carnivore, omnivore, herbivore	  

ASSESSMENT STATEMENTS		
WORKING TOWARDS	**WORKING AT EXPECTED LEVEL**	**WORKING AT GREATER DEPTH**
• Name the basic parts of the body. • Name the senses and say which body part is associated with each sense. • Identify and name a range of common animals. • Describe the structure of common animals, including some parts of the body that are specific to animals. • Say something that is the same and something that is different about two animals. • Understand that animals have different diets. • Use their senses to perform simple tests.	• Draw and label parts of their body. • Describe activities that use each of the five senses. • Sort animals into simple groups, including groups based on animal diets. • Describe animal bodies using relevant vocabulary. • Understand the difference between carnivores, herbivores and omnivores. • Identify and classify animals by suggesting groups that they belong to. • Gather and record information and use it to answer a puzzle.	• Label more parts of the human body. • Sort animals into Venn diagrams. • Remember the five main groups of animals and give examples for each one. • Remember the word for carnivore, herbivore and omnivore and give examples for each. • Generate their own questions when sorting animals into groups.

PLANTS – Describing The Basic Structure

KNOWLEDGE & UNDERSTANDING
• 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
• Plant seeds and care for growing plants. (Early Years – Plants) • Understand the key features of the life cycle of a plant and an animal. (Early Years – Plants)	• Observe and describe how seeds and bulbs grow into mature plants. (Y2 - Plants) • Find out and describe how plants need water, light and a suitable temperature to grow and stay healthy. (Y2 - Plants)

• Begin to understand the need to respect and care for the natural environment and all living things. (Early Years – Plants) • Explore the natural world around them. (Reception – Living things and their habitats) • Recognise some environments that are different to the one in which they live. (Reception – Living things and their habitats)	• Identify and name a variety of plants and animals in their habitats, including microhabitats. (Y2 - Living things and their habitats) • Identify and describe the functions of different parts of flowering plants: roots, stem/trunk, leaves and flowers. (Y3 - Plants) • Investigate the way in which water is transported within plants. (Y3 - Plants)

Common Misconceptions	Vocabulary	Enquiry Skills
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. •	**Tier 1:** leaves, flowers, fruit, plant, soil, water, food, sunlight **Tier 2:** stem, root, seed, bulb, wild plants, garden plants, weed, bean **Tier 3:** deciduous, evergreen	

ASSESSMENT STATEMENTS		
WORKING TOWARDS	**WORKING AT EXPECTED LEVEL**	**WORKING AT GREATER DEPTH**
• Plant a bean • Find plants in the wild and identify them by a picture. • Say the names of parts of trees. • Describe a bean plant using words from a word bank. • Say three things that plants need to grow. • Match leaves they have collected to pictures of a leaf.	• Identify some garden plants that they see in photographs. • Name some garden plants from memory. • Identify some common plants in the wild. • Label the parts of a plant. • Sort leaves into groups. • Generate questions about plants. • Measure the growth of a bean plant with a ruler. • Use their observations to give reasons for their answers to questions.	• Describe the difference between deciduous and evergreen. • Use information they have gathered to answer a question. • Suggest a way to answer a question using the equipment that has been provided.

Year 2

ANIMALS INCLUDING HUMANS – Needs for survival

KNOWLEDGE & UNDERSTANDING

- 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
• Identify and name a variety of common animals that are carnivores, herbivores and omnivores. (Y1 - Animals, including humans) • Identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense. (Y1 - Animals, including humans)	• Identify that animals, including humans, need the right types and amount of nutrition, and that they cannot make their own food; they get nutrition from what they eat. (Y3 - Animals, including humans) • Describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird. (Y5 - Living things and their habitats) • Describe the life process of reproduction in some plants and animals. (Y5 - Living things and their habitats) • Recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function. (Y6 - Animals, including humans)

Common Misconceptions	Vocabulary	Enquiry Skills
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.	**Tier 1:** baby, child, adult, names of animals and their babies (e.g. chick/hen, kitten/cat, caterpillar/butterfly), water, food, air, germs, exercise, grow **Tier 2:** toddler, teenager, develop, frogspawn, tadpole, froglet, life cycle, exercise, heartbeat, food types (e.g. meat, fish, vegetables, fruit, bread, rice, pasta, dairy) **Tier 3:** offspring, reproduction, hygiene, nutrition, live young, carbohydrates, protein, dairy, oils	

ASSESSMENT STATEMENTS		
WORKING TOWARDS	**WORKING AT EXPECTED LEVEL**	**WORKING AT GREATER DEPTH**
• Say which animal some babies will grow into. • Name some animal babies. • Say the three things that humans need to stay alive. • Generate examples of healthy and less healthy food. • Name some things that humans do to keep themselves clean.	• Say how an animal will change as it grows. • Name the different stages in the human timeline. • Set up a simple test, collect and interpret results. • Say how an animal gets air, food and water. • Research the answer to a question. • Say what is healthy about their diets. • Say how they could improve their diet. • Give a reason why humans need to exercise. • Name one effect that exercise has on the human body. • Record information about exercise • Use information to answer questions. • Give reasons why humans should keep themselves clean.	• Describe what humans are like during the different stages of their lives. • Design a menu that has the right amount of each different food type.

USES OF EVERYDAY MATERIALS

KNOWLEDGE & UNDERSTANDING

- Identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses.
- Find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching.

Prior Learning	Future Learning
• Distinguish between an object and the material from which it is made. (Y1 - Everyday materials) • Identify and name a variety of everyday materials, including wood, plastic, glass, metal, water, and rock. (Y1 - Everyday materials) • Describe the simple physical properties of a variety of everyday materials. (Y1 - Everyday materials) • Compare and group together a variety of everyday materials on the basis of their simple physical properties. (Y1 - Everyday materials)	• Compare and group together different kinds of rocks on the basis of their appearance and simple physical properties. (Y3 - Rocks) • Notice that some forces need contact between two objects, but magnetic forces can act at a distance. (Y3 - Forces and magnets) • Compare and group together everyday materials on the basis of their properties, including their hardness, solubility, transparency, conductivity (electrical and thermal), and response to magnets. (Y5 - Properties and changes of materials)

	• Give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic. (Y5 - Properties and changes of materials)

Common Misconceptions	Vocabulary	Enquiry Skills
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.	**Tier 1:** wood, metal, plastic, glass, brick, rock, paper, cardboard, Properties of materials – as for Year 1, Shape, push/pushing, pull/pulling, twist/twisting, squash/squashing, bend/bending, stretch/stretching, recycling **Tier 2:** opaque, transparent and translucent, reflective, non-reflective, flexible, rigid, **Tier 3:** suitability, lightweight, hard-wearing	   

ASSESSMENT STATEMENTS		
WORKING TOWARDS	**WORKING AT EXPECTED LEVEL**	**WORKING AT GREATER DEPTH**
• Identify and name everyday materials. • Identify different uses of everyday materials. • Record their observations. • Demonstrate and explain how shapes of objects made from some materials can be changed. • Explain what recycling means.	• Compare the uses of different everyday materials. • Compare the suitability of different everyday materials. • Explain the basic progress of recycling. • Explain the advantages of recycling.	• classify the uses of different everyday materials • compare and explain the suitability of everyday materials in different circumstances • use their observations, ideas and experiences to ask and answer simple questions • suggest reasons for specific outcomes • explain how recycling impacts positively on the environment

PLANTS – Understanding how they grow

KNOWLEDGE & UNDERSTANDING

- Observe and describe how seeds and bulbs grow into mature plants.
- Find out and describe how plants need water, light and a suitable temperature to grow and stay healthy.

Prior Learning	Future Learning
• Identify and name a variety of common wild and garden plants, including deciduous and evergreen trees. (Y1 - Plants) • Identify and describe the basic structure of a variety of common flowering plants, including trees. (Y1 - Plants)	• Identify and describe the functions of different parts of flowering plants: roots, stem/trunk, leaves and flowers. (Y3 - Plants) • Explore the requirements of plants for life and growth (air, light, water, nutrients from soil, and room to grow) and how they vary from plant to plant. (Y3 - Plants) • Investigate the way in which water is transported within plants. (Y3 - Plants) • Explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal. (Y3 - Plants)

Common Misconceptions	Vocabulary	Enquiry Skills
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.	**Tier 1:** light, shade, Sun, warm, cool, water, space, grow, healthy, bulb, germinate, shoot, **Tier 2:** sprout, germinate, seedling, temperature, nutrition, sunlight **Tier 3:** seed dispersal	

ASSESSMENT STATEMENTS		
WORKING TOWARDS	**WORKING AT EXPECTED LEVEL**	**WORKING AT GREATER DEPTH**
• Look closely at plants and trees. • Record what they see by drawing or writing. • Follow instructions to plant a seed and a bulb. • Order the life cycle of a plant. • Suggest how to care for a plant so it grows well. • Explain that plants are living things.	• Label the main parts of plants and trees. • Describe the stages in the life cycle of a plant. • Explain that plants need water, light and a suitable temperature to grow well. • Record plant growth in a bar chart. • Use observations to explain how we can tell that plants are living things. • Set up a simple comparative test. • Make a simple prediction.	• Explain that different plants have different needs. • Compare the growth of different plants. • Give reasons for their answers. • Use observations to suggest conditions that plants need to grow well.

LIVING THINGS AND THEIR HABITATS – Compare Living and Non-living

KNOWLEDGE & UNDERSTANDING

- 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
• Identify and name a variety of common wild and garden plants, including deciduous and evergreen trees. (Y1 - Plants) • Identify and describe the basic structure of a variety of common flowering plants, including trees. (Y1 - Plants) • Identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals. (Y1 - Animals including humans) • Identify and name a variety of common animals that are carnivores, herbivores and omnivores. (Y1 - Animals including humans) • • Describe and compare the structure of a variety of common animals (fish, amphibians, reptiles, birds and mammals, including pets). (Y1 – Animals, including humans) • Observe changes across the four seasons. (Y1 - Seasonal changes)	• Recognise that living things can be grouped in a variety of ways. (Y4 -Living things and their habitats) • Explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment. (Y4 - Living things and their habitats) • Recognise that environments can change and that this can sometimes pose dangers to living things. (Y4 - Living things and their habitats) • Construct and interpret a variety of food chains, identifying producers, predators and prey. (Y4 - Animals, including humans)

Common Misconceptions	Vocabulary	Enquiry Skills
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'.	**Tier 1:** living, alive, used to be alive, water, air, move, rocks, feed, bird, fish, shelter, safety, space, air **Tier 2:** never alive, healthy, mammal, reptile, amphibian, protection, suitable, conditions, environment, survive, desert, ocean, polar, rainforest, grasslands **Tier 3:**	  

	habitat, basic needs, microhabitat, woodland, coastal, urban, local, minibeast, food sources	

ASSESSMENT STATEMENTS		
WORKING TOWARDS	**WORKING AT EXPECTED LEVEL**	**WORKING AT GREATER DEPTH**
• Say what is different about things that are living, dead or have never been alive. • Identify some of the plants and animals in a familiar habitat. • Sort objects into categories. • Find microhabitats. • Describe the conditions in a habitat. • Ask questions about different habitats. • Name some sources of food.	• Explain some of the life processes. • Ask questions to decide if a thing is living, dead or has never been living. • Identify some plants and animals in global habitats. • Sort categories and give reasons for their choices. • identify and name mini-beasts in microhabitats. • Gather and record information. • Suggest how an animal is able to survive in their habitat. • Answer questions about habitats they have researched. • Explain why the animals in a habitat need the plants.	• Identify a variety of plants and animals in a range of habitats. • Choose their own objects to go in given categories. • Use information they have gathered to suggest an answer to a question. • Suggest why the plants in a habitat need the animals.

Year 3

ANIMALS INCLUDING HUMANS - Food and Our Bodies

KNOWLEDGE & UNDERSTANDING

- Identify that animals, including humans, need the right types and amount of nutrition, and that they cannot make their own food –they get nutrition from what they eat.
- Identify that humans and some other animals have skeletons and muscles for support, protection and movement.

Prior Learning	Future Learning
• Identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals. (Y1 - Animals, including humans) • Identify and name a variety of common animals that are carnivores, herbivores and omnivores. (Y1 - Animals, including humans) • Describe and compare the structure of a variety of common animals (fish, amphibians, reptiles, birds and mammals, including pets). (Y1 - Animals, including humans) • Find out about and describe the basic needs of animals, including humans, for survival (water, food and air). (Y2 - Animals, including humans) • Describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene. (Y2 - Animals, including humans)	• Describe the simple functions of the basic parts of the digestive system in humans. (Y4 - Animals, including humans) • Identify the different types of teeth in humans and their simple functions. (Y4 - Animals, including humans) • Construct and interpret a variety of food chains, identifying producers, predators and prey. (Y4 - Animals, including humans) • Recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function. (Y6 - Animals, including humans)

Common Misconceptions	Vocabulary	Enquiry Skills
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.	**Tier 1:** skeleton, bones, muscles, joints, support, protect, move, skull, ribs, spine **Tier 2:** carbohydrates, sugars, protein, vitamins, minerals, fibre, fat, water **Tier 3:** nutrition, nutrients, exoskeleton, endoskeleton	

ASSESSMENT STATEMENTS		
WORKING TOWARDS	**WORKING AT EXPECTED LEVEL**	**WORKING AT GREATER DEPTH**
• Understand that plants and animals obtain food in different ways. • Identify the right types and demonstrate they understand the right amounts of nutrients for animals including humans. • Name the different types of skeletons as well as identify and categorise animals based on the type of skeleton it has. • Identify the main bones in the body and how a skeleton protects, supports and helps the body to move. • Explain how pairs of muscles work together to enable movement.	• Explain the different ways that plants and animals including humans obtain food. • Explain the difference between food groups and nutrient groups. • Explain what the right type and amounts of nutrition are for human beings as well as some of the consequences related to eating the wrong type of diet. • Use the scientific names for the main bones in the human body and explain how the skeleton protects, supports and helps the body to move. • Set up a simple practical enquiry and write an explanation for their findings.	• Explain why humans need some types of nutrients. • Identify the similarities and differences between animals based on their diets. • Identify the pros and cons of different types of skeletons and explain how the different parts of a skeleton work. • Extend their knowledge by identifying the main bones in the skeleton of animals other than humans. • Make modifications to their practical enquiry while conducting it and be able to write a conclusion that links their findings to support or refute general scientific ideas.

ROCKS AND SOILS

KNOWLEDGE & UNDERSTANDING
• Compare and group together different kinds of rocks on the basis of their appearance and simple physical properties. • Describe in simple terms how fossils are formed when things that have lived are trapped within rock. • Recognise that soils are made from rocks and organic matter.

Prior Learning	Future Learning
• Distinguish between an object and the material from which it is made. (Y1 - Everyday materials) • Identify and name a variety of everyday materials, including wood, plastic, glass, metal, water, and rock. (Y1 - Everyday materials) • Describe the simple physical properties of a variety of everyday materials. (Y1 - Everyday materials) • Compare and group together a variety of everyday materials on the basis of their simple physical properties. (Y1 - Everyday materials) • Identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses. (Y2 - Uses of everyday materials)	• Recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago. (Y6 - Evolution and inheritance) • The composition of the Earth. (KS3) • The structure of the Earth. (KS3) • The rock cycle and the formation of igneous, sedimentary and metamorphic rocks. (KS3)

Common Misconceptions	Vocabulary	Enquiry Skills
Some children 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.	**Tier 1:** volcano, natural, appearance, rock, hard, soft, chalk, clay, marble, slate, purpose, fossil, living things, bones, layers, footprints, compost, soil, fossil, water **Tier 2:** minerals, permeable, impermeable, durable, decay, nutrients, permeability **Tier 3:** igneous, sedimentary, metamorphic, sediment, granite, sandstone, subsoil, bedrock, clay-based soil, sandy soil, chalky soil	

ASSESSMENT STATEMENTS		
WORKING TOWARDS	**WORKING AT EXPECTED LEVEL**	**WORKING AT GREATER DEPTH**
• Name the three different types of rocks. • Handle and examine rocks to identify their properties, with support. • State the four different types of matter that soil is composed of. • Children will learn to make careful observations. • They will be able to take part in and contribute towards an oral presentation of their observations.	• Children will be able to give examples of natural and humanmade rocks. • They will be able to group rocks by their properties and identify simple similarities and differences. • Children will be able to explain the difference between a bone and a fossil. • They will be able to explain, using simple scientific language, how soil is formed. • They will make and record observations accurately.	• Children will make systematic observations. • They will be able to explain the main processes of fossilisation. • They will be able to identify the importance of Mary Anning's work to the field of palaeontology. • Children will use simple scientific language accurately in oral and written work

MAGNETS AND FORCES

KNOWLEDGE & UNDERSTANDING

- 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
• Explore how things work. (Early Years – Forces) • Explore and talk about different forces they can feel. (Early Years – Forces) • Talk about the differences between materials and changes they notice. (Early Years – Forces) • Explore the natural world around them. (Reception – Forces) • Describe what they see, hear and feel whilst outside. (Reception – Forces) • Find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching. (Y2 - Uses of everyday materials)	• Explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object. (Y5 -Forces) • Identify the effects of air resistance, water resistance and friction, that act between moving surfaces. (Y5 - Forces) • Recognise that some mechanisms, including levers, pulleys and gears, allow a smaller force to have a greater effect. (Y5 - Forces) • Magnetic fields by plotting with compass, representation by field lines. (KS3) • Earth's magnetism, compass and navigation. (KS3)

Common Misconceptions	Vocabulary	Enquiry Skills
Some children think: • the bigger the magnet the stronger it is • all metals are magnetic.	**Tier 1:** Force, push, pull, twist, magnet, strength, metal, north pole, south pole **Tier 2:** attract, repel, iron, steel, magnetic force, magnetic material **Tier 3:** contact force, non-contact force, bar magnet, ring magnet, button magnet, horseshoe magnet	

ASSESSMENT STATEMENTS		
WORKING TOWARDS	**WORKING AT EXPECTED LEVEL**	**WORKING AT GREATER DEPTH**
• Identify forces as pushes and pulls. • Describe friction as a force that slows objects down. • Feel the pulling force of a magnet. • Sort materials according to whether they are magnetic or not. • Participate in an investigation into magnet strength. • Identify the different poles of a bar magnet.	• Identify the type of force required to carry out an action. • Investigate the force of friction produced by different surfaces. • Explain that magnets produce an invisible pulling force. • Identify magnetic materials. • Identify different types of magnets. • Investigate the strength of different magnets.	• Make generalisations about the types of surfaces that produce the most or least friction. • Identify and describe the invisible magnetic field around a magnet. • Make generalisations about the types of materials that are attracted to magnets. • Use a magnetic compass with 8 points. • Construct a bar chart of their results. • Explain their predictions and conclusions.

• Use a magnetic compass with four points. • Make a prediction. • Construct a bar chart on labelled axes. • Form a conclusion from their results.	• Identify when magnets will repel or attract based on their poles. • Construct a bar chart of their results. • Explain their predictions and conclusions using key words or prompts	

PLANTS – Parts of The Plant and their Functions

KNOWLEDGE & UNDERSTANDING

- Identify and describe the functions of different parts of flowering plants: roots; stem/trunk; leaves; and flowers.
- Explore the requirements of plants for life and growth (air, light, water, nutrients from soil, and room to grow) and how they vary from plant to plant.
- Investigate the way in which water is transported within plants.
- Explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal

Prior Learning	Future Learning
• Observe and describe how seeds and bulbs grow into mature plants. (Y2 - Plants) • Find out and describe how plants need water, light and a suitable temperature to grow and stay healthy. (Y2 – Plants)	• Describe the life process of reproduction in some plants and animals. (Y5 - Living things and their habitats) • Reproduction in plants, including flower structure, wind and insect pollination, fertilisation, seed and fruit formation and dispersal, including quantitative investigation of some dispersal mechanisms. (KS3)

Common Misconceptions	Vocabulary	Enquiry Skills
Some children 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.	**Tier 1:** pollen, insect, wind, male, female, air, nutrients, minerals, soil, transport, seed, stem, root, leaves, flowers, light, water, flowers **Tier 2:** absorb, seed formation, seed dispersal (wind dispersal, animal dispersal, water dispersal) **Tier 3:** pollination, photosynthesis, reproduction, germination	

ASSESSMENT STATEMENTS		
WORKING TOWARDS	**WORKING AT EXPECTED LEVEL**	**WORKING AT GREATER DEPTH**
• Identify the different parts of flowering plants. • Predict what will happen in an investigation. • Make observations. • Identify the main stages of the life cycle of flowering plants.	• Explain the functions of the different parts of plants. • Set up an investigation and make predictions. • Make observations and conclusions. • Identify different parts of a flower. • Identify and describe the stages of the life cycle of flowering plants. • Be able to answer questions based on their learning.	• Set up reliable and accurate investigations. • Make and explain predictions. • Make and record accurate observations. • Use scientific language to explain their findings. • Explain the functions of the different parts of a flower. • Be able to ask and answer questions based on their learning using scientific language.

LIGHT AND SHADOWS

KNOWLEDGE & UNDERSTANDING

- 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
• Explore how things work. (Early Years – Light) • Talk about the differences in materials and changes they notice. (Early Years– Light) • Describe what they see, hear and feel whilst outside. (Reception – Light) • Identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense. (Y1 - Animals, including humans) • Describe the simple physical properties of a variety of everyday materials. (Y1 - Materials)	• Recognise that light appears to travel in straight lines. (Y6 - Light) • Use the idea that light travels in straight lines to explain that objects are seen because they give out or reflect light into the eye. (Y6 - Light) • Explain that we see things because light travels from light sources to our eyes or from light sources to objects and then to our eyes. (Y6 - Light) • Use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them. (Y6 - Light)

Common Misconceptions	Vocabulary	Enquiry Skills
Some children think: • we can still see even where there is an absence of any light • our eyes 'get used to' the dark	**Tier 1:** light, dark, dim, Sun, sunlight, shadow,	

• 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	dangerous, see, protect, block **Tier 2:** light source, reflect, reflection, surface **Tier 3:** opaque, translucent, transparent	

ASSESSMENT STATEMENTS		
WORKING TOWARDS	**WORKING AT EXPECTED LEVEL**	**WORKING AT GREATER DEPTH**
• Identify light sources. • Understand that we need light to see. • Know that light travels in a straight line. • Identify reflective surfaces. • Know that the sun can damage their eyes. • Know how to protect their eyes from the sun. • Understand that a shadow is formed when a solid object blocks light.	• Understand that dark is the absence of light. • Set up an investigation and make predictions. • Understand how surfaces reflect light. • Recognise that a mirror appears to reverse an image. • Understand how the sun can damage parts of the eye. • Identify opaque, translucent and transparent objects. • Know how shadows change size	• Explain the properties of materials that reflect light well. • Understand why shadows change size. • Set up reliable and accurate investigations. • Make and explain predictions. • Make and record accurate observations. • Use scientific language to explain their findings. • Be able to ask and answer questions based on their learning using scientific language

Year 4

ANIMALS INCLUDING HUMANS - Teeth, Eating and Digestion

KNOWLEDGE & UNDERSTANDING

- Describe the simple functions of the basic parts of the digestive system in humans.
- Identify the different types of teeth in humans and their simple functions.
- Construct and interpret a variety of food chains, identifying producers, predators and prey.

Prior Learning	Future Learning
• Identify and name a variety of common animals that are carnivores, herbivores and omnivores. (Y1 - Animals, including humans) • Find out about and describe the basic needs of animals, including humans, for survival (water, food and air). (Y2 - Animals, including humans) • Describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene. (Y2 - Animals, including humans) • Identify that animals, including humans, need the right types and amount of nutrition, and that they cannot make their own food; they get nutrition from what they eat. (Y3 - Animals, including humans)	• Identify and name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood. (Y6 -Animals, including humans) • Recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function. (Y6 - Animals, including humans) • Describe the ways in which nutrients and water are transported within animals, including humans. (Y6 - Animals, including humans)

Common Misconceptions	Vocabulary	Enquiry Skills
Some children 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”.	**Tier 1:** teeth, mouth, saliva, predator, prey, food chain, producer, digestive system **Tier 2:** incisor, canine, molar, premolars, herbivore, carnivore, omnivore **Tier 3:** nutrients, oesophagus, stomach, small intestine, large intestine, rectum, anus, primary consumer	

ASSESSMENT STATEMENTS		
WORKING TOWARDS	**WORKING AT EXPECTED LEVEL**	**WORKING AT GREATER DEPTH**
• Generate questions and use scientific evidence that is given to answer questions. • Identify similarities related to scientific ideas. • Set up a simple enquiry with support. • Make observations, record findings and use results to draw simple conclusions. • Name parts of the digestive system. • Add functions to the parts of the digestive system. • Identify the function of teeth in humans. • Construct a simple food chain.	• Generate relevant scientific questions. • Identify differences related to scientific ideas. • Make predictions and suggest equipment. • Make careful observations, record findings using labelled diagrams and use results to make predictions for new values. • Identify parts of the digestive system. • Match the parts of the digestive system with their functions. • Match the types and functions of teeth. • Construct and interpret a food chain.	• Distinguish between scientific and non-scientific evidence and select the best type of enquiry to answer a question. • Identify similarities and differences related to scientific ideas. • Give clear instructions to perform an enquiry. • Make systematic observations, record using scientific vocabulary and raise further questions based on their results. • Construct the digestive system. • Explain the functions of the digestive system. • Identify the types and functions of teeth.

ELECTRICITY

KNOWLEDGE & UNDERSTANDING

- 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.

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

Prior Learning	Future Learning
• Explore how things work. (Early Years - Electricity)	• Associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit. (Y6 - Electricity) • Compare and give reasons for variations in how components function, including the brightness of bulbs, the loudness of buzzers and the on/off position of switches. (Y6 - Electricity) • Use recognised symbols when representing a simple circuit in a diagram. (Y6 - Electricity)

Common Misconceptions	Vocabulary	Enquiry Skills
Some children 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.	**Tier 1:** electricity, electrical appliance/device, mains, plug, electrical circuit, metal, non-metal **Tier 2:** complete circuit, component, cell, battery, positive, negative, connect/connections, crocodile clip, bulb, switch, buzzer, motor **Tier 3:** conductor, insulator, loose connection, short circuit, symbol	

ASSESSMENT STATEMENTS

WORKING TOWARDS	WORKING AT EXPECTED LEVEL	WORKING AT GREATER DEPTH
• Learn to identify electrical and nonelectrical appliances. • Explain, with support, how a circuit works. • Name at least two electrical conductors and insulators. • Create a simple series circuit both with and without a switch. • Accurately record their findings in a table.	• Sort appliances based on whether they use mains or batteries. • They will be able to explain how a switch turns the electric current on and off. • Report their findings and conclusions orally.	• Explain why a circuit is incomplete. • Generalise about types of materials that conduct electricity. • Explain the conclusions they draw in investigations.

STATES OF MATTER

KNOWLEDGE & UNDERSTANDING

- Compare and group materials together, according to whether they are solids, liquids or gases.
- Observe that some materials change state when they are heated or cooled, and measure or research the temperature at which this happens in degrees Celsius (°C).
- Identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature.

Prior Learning	Future Learning
• Distinguish between an object and the material from which it is made. (Y1 - Everyday materials) • Identify and name a variety of everyday materials, including wood, plastic, glass, metal, water, and rock. (Y1 - Everyday materials) • Describe the simple physical properties of a variety of everyday materials. (Y1 - Everyday materials)	• Compare and group together everyday materials on the basis of their properties, including their hardness, solubility, transparency, conductivity (electrical and thermal), and response to magnets. (Y5 - Properties and changes of materials) • Know that some materials will dissolve in liquid to form a solution and describe how to recover a substance from a solution. (Y5 - Properties and changes of materials)

• Compare and group together a variety of everyday materials on the basis of their simple physical properties. (Y1 - Everyday materials) • Identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses. (Y2 - Uses of everyday materials) • Find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching. (Y2 - Uses of everyday materials)	• Use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating. (Y5 -Properties and changes of materials) • Give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic. (Y5 - Properties and changes of materials) • Demonstrate that dissolving, mixing and changes of state are reversible changes. (Y5 - Properties and changes of materials) • Explain that some changes result in the formation of new materials, and that this kind of change is not usually reversible, including changes associated with burning and the action of acid on bicarbonate of soda. (Y5 - Properties and changes of materials)

Common Misconceptions	Vocabulary	Enquiry Skills
Some children think: • 'solid' is another word for hard or opaque • solids are hard and cannot break or change shape easily and are often in one piece • substances made of very small particles like sugar or sand cannot be solids • particles in liquids are further apart than in solids and they take up more space • when air is pumped into balloons, they become lighter • water in different forms – steam, water, ice – are all different substances • all liquids boil at the same temperature as water (100 degrees) • melting, as a change of state, is the same as dissolving • steam is visible water vapour (only the condensing water droplets can be seen) • clouds are made of water vapour or steam • the substance on windows etc. is condensation rather than water • the changing states of water (illustrated by the water cycle) are irreversible • evaporating or boiling water makes it vanish • evaporation is when the Sun sucks up the water, or when water is absorbed into a surface/material	**Tier 1:** solid, liquid, gas, heating, cooling, state change, melting, freezing, boiling, temperature **Tier 2:** state change, boiling point, melting point, water vapour, particle **Tier 3:** evaporation, condensation, temperature, water cycle, precipitation	   

ASSESSMENT STATEMENTS		
WORKING TOWARDS	**WORKING AT EXPECTED LEVEL**	**WORKING AT GREATER DEPTH**
• Sort materials into solids, liquids and gases. • Explain that heating causes melting, and cooling causes freezing.	• Describe the properties of solids, liquids and gases. • Explain that melting and freezing are opposite processes that change the state of a material.	• Explain the behaviour of the particles in solids, liquids and gases. • Explain how heating and cooling causes materials to melt and freeze.

• Identify the melting and freezing point of water. • Describe evaporation and condensation using practical examples. • Describe the effect of temperature on evaporation referring to their investigation. • Identify the stages of the water cycle. • Predict what will happen in an investigation. • Make observations.	• Identify the melting and freezing point of several different materials • Explain that heating causes evaporation and cooling causes condensation. • Explain that evaporation and condensation are opposite processes that change the state of a material. • Explain that the higher the temperature, the quicker water evaporates. • Explain what happens to water at the different stages of the water cycle. • Make observations and conclusions. • Be able to answer questions based on their learning.	• Explain why a material's melting and freezing point is the same temperature. • Explain how heating and cooling can cause materials to evaporate and condense. • Explain why a higher temperature will speed up evaporation. • Use the water cycle to explain why the water we have on Earth today is the same water that has been here for millions of years. • Set up reliable and accurate investigations. • Make and explain predictions. • Make and record accurate observations. • Use scientific language to ask and answer questions and explain their findings.

LIVING THINGS AND THEIR HABITATS – Classification and Environmental Change

KNOWLEDGE & UNDERSTANDING

- Recognise that living things can be grouped in a variety of ways.
- Explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment.
- Recognise that environments can change and that this can sometimes pose dangers to living things.

Prior Learning	Future Learning
• Identify and name a variety of common wild and garden plants, including deciduous and evergreen trees. (Y1 - Plants) • Identify and describe the basic structure of a variety of common flowering plants, including trees. (Y1 - Plants) • Identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals. (Y1 - Animals including humans) • Describe and compare the structure of a variety of common animals (fish, amphibians, reptiles, birds and mammals, including pets). (Y1 – Animals, including humans) • Identify and name a variety of plants and animals in their habitats, including microhabitats. (Y2 - Living things and their habitats)	• Describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird. (Y5 - Living things and their habitats) • Describe the life process of reproduction in some plants and animals. (Y5 - Living things and their habitats) • Describe how living things are classified into broad groups according to common observable characteristics and based on similarities and differences, including microorganisms, plants and animals. (Y6 - Living things and their habitats) • Give reasons for classifying plants and animals based on specific characteristics. (Y6 - Living things and their habitats)

Common Misconceptions	Vocabulary	Enquiry Skills
Some children 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.	**Tier 1:** insect, plant, animal, litter, bird, fish, local area, pond **Tier 2:** organism, species, classification, characteristic, habitat, impact, environment, vertebrate, invertebrate, predator, prey, carnivore, herbivore, omnivore, pollution, decline, human-made **Tier 3:** warm-blooded, cold-blooded, biodiversity, endangered species, extinct, metamorphosis, classification key	

ASSESSMENT STATEMENTS		
WORKING TOWARDS	**WORKING AT EXPECTED LEVEL**	**WORKING AT GREATER DEPTH**
• Sort living things into groups. • Generate questions about animals. • See similarities and differences between vertebrates. • Identify vertebrate groups. • Identify the characteristics of living things. • Suggest how to have a positive effect on the local environment. • Record observations on a map. • Name some endangered species.	• Generate criteria to use to sort living things. • Sort living things into a Venn diagram. • Sort living things into a Carroll diagram. • Use questions to sort animals using a key. • Use a key to identify invertebrates by looking at their characteristics. • Use the characteristics of living things to sort them using a classification key. • Show the characteristics of living things in a table. • Create a classification key. • Identify dangers to wildlife in the local and wider environment. • Record observations in a table	• Explain, using evidence, how they have identified invertebrates. • Explain in more detail how changes to the environment have affected endangered species

SOUND

KNOWLEDGE & UNDERSTANDING

- 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
• Explore how things work. (Early Years – Sound) • Describe what they see, hear and feel whilst outside. (Reception – Sound) • Identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense. (Y1 - Animals, including humans)	• Waves on water as undulations which travel through water with transverse motion; these waves can be reflected and add or cancel –superposition. (KS3) • Frequencies of sound waves, measured in Hertz (Hz); echoes, reflection and absorption of sound. (KS3) • Sound needs a medium to travel, the speed of sound in air, in water, in solids. (KS3) • Sound produced by vibrations of objects, in loudspeakers, detected by their effects on microphone diaphragm and the ear drum; sound waves are longitudinal. (KS3) • Auditory range of humans and animals. (KS3) • Pressure waves transferring energy; use for cleaning and physiotherapy by ultra-sound. (KS3) • Waves transferring information for conversion to electrical signals by microphone. (KS3)

Common Misconceptions	Vocabulary	Enquiry Skills
Some children think: • sound is only heard by the listener • sound only travels in one direction from the source • sound can't travel through solids and liquids • high sounds are load and low sounds are quiet • pitch and volume are frequently confused, as both can be described as high or low	**Tier 1:** ear, ear drum, sound, source, vibrate, vibration, travel, pitch (high, low), volume, faint, loud **Tier 2:** insulation, sound wave, soundproof, particle **Tier 3:** amplitude, vacuum	

ASSESSMENT STATEMENTS		
WORKING TOWARDS	**WORKING AT EXPECTED LEVEL**	**WORKING AT GREATER DEPTH**
• Describe sounds around them. • Identify high and low sounds. • Identify loud and quiet sounds. • Observe how different sounds are made. • Describe how sounds change over distance. • Participate in an investigation to find the best material for absorbing sound. • Answer questions based on their learning using prompts. • Create a musical instrument that will play different sounds. • Predict what will happen in an investigation. • Make observations.	• Explain how sound sources vibrate to make sounds. • Explain how vibrations change when the loudness of a sound changes. • Explain how sounds travel to reach our ears. • Describe the pitch of a sound. • Describe patterns between the pitch of a sound and the features of the object that made the sound. • Explain how sound travels through a string telephone. • Identify the best material for absorbing sound. • Create a musical instrument that can play high, low, loud and quiet sounds. • Make observations and conclusions. • Be able to answer questions based on their learning.	• Explain how we hear and interpret sounds. • Explain that sounds travel differently through different materials. • Identify and explain patterns between the pitch of a sound and the features of the object that made the sound. • Explain how sounds change over distance • Explain why sounds travel better through solids than gases. • Explain why some materials absorb sound. • Explain how their musical instrument plays different sounds. • Set up reliable and accurate investigations. • Make and explain predictions. • Make and record accurate observations. • Use scientific language to explain their findings. • Be able to ask and answer questions based on their learning using scientific language

Year 5

PROPERTIES OF MATERIALS AND HOW THEY CHANGE

KNOWLEDGE & UNDERSTANDING

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

Prior Learning	Future Learning
• Identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses. (Y2 - Uses of everyday materials) • Find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching. (Y2 - Uses of everyday materials) • Compare and group 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) • Compare and group materials together, according to whether they are solids, liquids or gases. (Y4 - States of matter) • Observe that some materials change state when they are heated or • cooled, and measure or research the temperature at which this happens in degrees Celsius (°C). (Y4 - States of matter) • Identify the part played by evaporation and condensation in the water • cycle and associate the rate of evaporation with temperature. (Y4 - States of matter)	• Chemical reactions as the rearrangement of atoms. (KS3) Representing chemical reactions using formulae and using equations. (KS3) • Combustion, thermal decomposition, oxidation and displacement reactions. (KS3) • Defining acids and alkalis in terms of neutralisation reactions. (KS3) • The pH scale for measuring acidity/alkalinity; and indicators. (KS3)

Common Misconceptions	Vocabulary	Enquiry Skills
Some children may think: • thermal insulators keep cold in or out • thermal insulators warm things up	**Tier 1:** burning, rusting, evaporating, dissolving,	

• solids dissolved in liquids have vanished and so you cannot get them back • lit candles only melt, which is a reversible change.	mixture, soluble, insoluble **Tier 2:** thermal/electrical insulator/conductor, change of state, filter, sieve **Tier 3:** solution, reversible, non-reversible, new material	

ASSESSMENT STATEMENTS		
WORKING TOWARDS	**WORKING AT EXPECTED LEVEL**	**WORKING AT GREATER DEPTH**
• Identify materials. • Describe materials' properties • Identify thermal and electrical conductors and insulators • Identify materials that are soluble or insoluble in water. • Follow instructions to separate mixtures Identify irreversible changes. • Predict what will happen in an investigation. • Make observations.	• Follow instructions to test a material's properties. • Explain the uses of thermal and electrical conductors and insulators. • Order materials according to their electrical conductivity. • Explain and investigate dissolving. • Explain the processes used to separate mixtures. • Explain irreversible changes. • Identify the variables in an investigation. • Make observations and conclusions. • Be able to answer questions based on their learning.	• Devise their own ways to test a material's properties. • Explain the uses of a material according to its properties. • Explain why materials have dissolved in certain conditions. • Select and explain the most suitable processes to separate different mixtures. • Identify the new materials made in irreversible changes. • Identify dependent, independent and controlled variables. • Set up reliable and accurate investigations. • Make and explain predictions. • Make and record accurate observations. • Use scientific language to explain their findings. • Use their results to make generalisations and further predictions. • Be able to ask and answer questions based on their learning using scientific language

FORCES

KNOWLEDGE & UNDERSTANDING

- 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

- 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)

Future Learning

- 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)

Common Misconceptions

Some children may think:

- the heavier the object the faster it falls, because it has more gravity acting on it
- forces always act in pairs which are equal and opposite
- smooth surfaces have no friction
- objects always travel better on smooth surfaces
- a moving object has a force which is pushing it forwards and it stops when the pushing force wears out
- a non-moving object has no forces acting on it
- heavy objects sink and light objects float. Apply knowledge

Vocabulary

Tier 1:
force, push, pull, thrust, opposing, weight, measure, results, parachute, machine
Tier 2:
gravity, accelerate, decelerate, mass, prediction, investigation, observe, variables, conclusion, streamlined
Tier 3:
air resistance, water resistance, friction, newton, newton meter, mechanism, lever, gear, pulley

Enquiry Skills

ASSESSMENT STATEMENTS		
WORKING TOWARDS	**WORKING AT EXPECTED LEVEL**	**WORKING AT GREATER DEPTH**
• Children can identify the effects of air • resistance, water resistance and friction scaffolding. • Children can explain, in simple terms, that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object. • With support, children can identify the effects of friction that act between moving surfaces. • With support, children can identify the effects of air resistance. • With support, children can identify the effects of water resistance. • With support, children are beginning to understand that some mechanisms, including levers, pulleys and gears, allow a smaller force to have a greater effect.	• Children can identify the effects of air resistance, water resistance and friction. • Children can explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object. • Children can identify the effects of friction that act between moving surfaces and are beginning to explain these effects. • Children can identify the effects of air resistance. • Children can identify the effects of water resistance. • Children can recognise that some mechanisms, including levers, pulleys and gears, allow a smaller force to have a greater effect.	• Children can identify the effects of air resistance, water resistance and friction with confidence. • Children can confidently explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object, using accurate scientific language. • Children can independently identify the effects of friction that act between moving surfaces and explain these effects using accurate scientific vocabulary. • Children can identify the effects of air resistance and discuss these with confidence. • Children can independently identify the effects of water resistance and discuss these with confidence. Children can recognise and explain, with increasing confidence, how some mechanisms, including levers, pulleys and gears, allow a smaller force to have a greater effect

EARTH AND SPACE

KNOWLEDGE & UNDERSTANDING
• 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)	• Gravity force, weight = mass x gravitational field strength (g), on Earth g=10 N/kg, different on other planets and stars; gravity forces

• 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)	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)

Common Misconceptions	Vocabulary	Enquiry Skills
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.	**Tier 1:** sun, Earth, moon, star, planet, day, night, solar system, Neptune, Pluto, Mercury, Venus, Mars, Uranus, universe **Tier 2:** Sphere, rotate, orbit, axis, satellite **Tier 3:** Heliocentric model, Geocentric model, celestial body, dwarf planet, Galileo Galilei	

ASSESSMENT STATEMENTS

WORKING TOWARDS	WORKING AT EXPECTED LEVEL	WORKING AT GREATER DEPTH
• Describe a sphere. • Identify scientific evidence with support. Name the planets in the solar system with support. • Explain how the planets orbit the Sun. Explain how night and day occur. • Make predictions about night and day in different places on Earth • Report and present findings from enquiries with support. • Explain that the Moon orbits the Earth not the Sun.	• Describe the Sun, Earth and Moon as spherical. Name the planets in the solar system independently. • Distinguish between heliocentric and geocentric ideas of planetary movement. • Explain that day and night is due to rotation of the Earth. • Support the idea that different places on Earth experience night and day at different times with evidence. • Report and present findings from enquiries. • Explain how the Moon moves relative to the Earth.	• Name at least two different shapes the Earth was thought to be • Identify scientific evidence that has been used to support or refute ideas. • Describe some features of the planets. • Place the planets in the solar system in the correct order. • Explain theories of planetary movement in the solar system using evidence. • Explain using evidence how night and day occur. Explain why night and day occur at different times in different places on Earth. • Write a conclusion which explains my findings. Explain how the Earth and Moon move relative to the Sun

LIVING THINGS AND THEIR HABITATS – Reproduction in animals and plants

KNOWLEDGE & UNDERSTANDING

- Describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird.
- Describe the life process of reproduction in some plants and animals.

Prior Learning	Future Learning
• Notice that animals, including humans, have offspring which grow into adults. (Y2 - Animals, including humans) • Explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal. (Y3 – Plants)	• Reproduction in humans (as an example of a mammal), including the structure and function of the male and female reproductive systems, menstrual cycle (without details of hormones), gametes, fertilisation, gestation and birth, to include the effect of maternal lifestyle on the foetus through the placenta. (KS3) • Reproduction in plants, including flower structure, wind and insect pollination, fertilisation, seed and fruit formation and dispersal, including quantitative investigation of some dispersal mechanisms. (KS3)

Common Misconceptions	Vocabulary	Enquiry Skills
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.	**Tier 1:** life cycles, reproduce, fertilisers **Tier 2:** Runners, tubers, bulbs, cuttings **Tier 3:** sexual, asexual	

ASSESSMENT STATEMENTS

WORKING TOWARDS	WORKING AT EXPECTED LEVEL	WORKING AT GREATER DEPTH
• Identify parts of a flower. • Give one difference between sexual and asexual reproduction. • Describe ways plants can be pollinated. • Describe ways to grow new plants other than from seed. • Identify the stages in the process of sexual reproduction.	• Explain the function of the parts of a flower. • Give two differences between sexual and asexual reproduction. • Identify the features of plants pollinated by insects or the wind. • Describe the stages of sexual reproduction.	• Give two advantages and two disadvantages of sexual and asexual reproduction. • Explain how a plant's features are adapted to pollination by insect or wind. • Explain that plants that reproduce asexually are genetically identical to the parent plant.

• Order the stages of the life cycles of mammals, birds, insects and amphibians.	• Describe the stages of the life cycles of mammals, birds, insects and amphibians.	• Compare the stages of the life cycles of plants, mammals, birds, insects and amphibians.

ANIMALS INCLUDING HUMANS- Changes due to development in age (Linked to RSE)

KNOWLEDGE & UNDERSTANDING

- Describe the changes as humans develop to old age

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

Common Misconceptions	Vocabulary	Enquiry Skills
Some children may think: • a baby grows in a mother's tummy • a baby is "made".	**Tier 1:** life cycles, adulthood, reproduce **Tier 2:** life expectancy, puberty, hormones **Tier 3:** prenatal, gestation	

ASSESSMENT STATEMENTS

WORKING TOWARDS	WORKING AT EXPECTED LEVEL	WORKING AT GREATER DEPTH
• Compare and present data using bar and line graphs. • Report findings in oral form. • Order the stages of human development. • Demonstrate understanding of how babies grow in height. • Describe the main changes that occur during puberty. • Explain the main changes that take place in old age.	• Compare graph types and select which is most appropriate for my data. • Analyse and report findings in written explanations. • Name the 6 stages of human development. • Give reasons why changes occur during puberty.	• Explain the changes that occur during stages of human development. • Demonstrate understanding of how babies grow in height and weight. • Analyse the similarities and differences between how boys and girls experience puberty

Year 6

ANIMALS INCLUDING HUMANS- Circulatory System and Health

KNOWLEDGE & UNDERSTANDING

- 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 body's function.

Describe the ways in which nutrients and water are transported within animals, including humans.

Prior Learning	Future Learning
• Describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene. (Y2 - Animals, including humans) • Identify that animals, including humans, need the right types and amount of nutrition, and that they cannot make their own food; they get nutrition from what they eat. (Y3 - Animals, including humans) • Describe the simple functions of the basic parts of the digestive system in humans. (Y4 - Animals, including humans) • Identify the different types of teeth in humans and their simple functions. (Y4 - Animals, including humans)	• The consequences of imbalances in the diet, including obesity, starvation and deficiency diseases. (KS3) • The effects of recreational drugs (including substance misuse) on behaviour, health and life processes. (KS3) • The structure and functions of the gas exchange system in humans, including adaptations to function. (KS3) • The mechanism of breathing to move air in and out of the lungs. (KS3) • The impact of exercise, asthma and smoking on the human gas exchange system. (KS3)

Common Misconceptions	Vocabulary	Enquiry Skills
Some children may think: • your heart is on the left side of your chest • the heart makes blood • the blood travels in one loop from the heart to the lungs and around the body • when we exercise, our heart beats faster to work the muscles more • some blood in our bodies is blue and some blood is red • we just eat food for energy • all fat is bad for you • all dairy is good for you • protein is good for you, so you can eat as much as you want • foods only contain fat if you can see it • all drugs are bad for you.	**Tier 1:** heart, rate, pulse, pumps, blood, blood vessels, transported, lungs, oxygen, carbon dioxide, nutrients, water, muscles, diet, exercise, drugs, lifestyle, alcohol **Tier 2:** circulatory system, arteries, capillaries, veins **Tier 3:** oxygenated blood, deoxygenated blood, plasma	

ASSESSMENT STATEMENTS		
WORKING TOWARDS	**WORKING AT EXPECTED LEVEL**	**WORKING AT GREATER DEPTH**
• Identify the main parts of the circulatory system. • Explain the main functions of the heart, lungs and blood in the circulatory system. • State how the digestive system breaks down nutrients. • Explain what constitutes a healthy lifestyle. • Describe how drugs and alcohol can impact negatively on the body. • Take accurate measures of the pulse rate. • Record results and write a report which includes a conclusion.	• Demonstrate prior knowledge of systems within the human body. • Explain the specific functions of the lungs in the circulatory system. • Understand the processes of how water and nutrients are transported in the body. • State the beneficial impact of a healthy diet and exercise on the human body. • Describe how smoking cigarettes impacts negatively on the body. • Decide on the most appropriate type of investigation for their question. • Take repeat readings if necessary. • Report the degree of trust they have in their results.	• Name the organs, the main parts of those organs and the functions of each in the circulatory system. • Identify and explain the processes which break down food into nutrients. • Understand how the circulatory and digestive system connect to transport water and nutrients throughout the body. • Identify and explain the variables they will control in an investigation. • Choose the most appropriate graph to present their data. • Explain how scientific evidence has changed ideas about smoking.

LIVING THINGS AND THEIR HABITATS – Classifying Micro-organisms

KNOWLEDGE & UNDERSTANDING

- 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
• Recognise that living things can be grouped in a variety of ways. (Y4 -Living things and their habitats) • Explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment. (Y4 - Living things and their habitats) • Describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird. (Y5 - Living things and their habitats) • Describe the life process of reproduction in some plants and animals. (Y5 - Living things and their habitats)	• Differences between species. (KS3)

Common Misconceptions	Vocabulary	Enquiry Skills
Some children may think: • all micro-organisms are harmful • mushrooms are plants.	**Tier 1:** plant, animal, body, group, sort, observe, insect, bird, fish, spine **Tier 2:** organism, characteristics, classification, species, classification key, spores, microscopic, yeast, microscope, criteria, fungus, bacteria, observable characteristics, antibiotic, ferment, decompose, virus, mould, flowering, non-flowering **Tier 3:** taxonomist, Carl Linnaeus, binomial naming system, genus, microorganism, microbes, single-celled	

ASSESSMENT STATEMENTS		
WORKING TOWARDS	**WORKING AT EXPECTED LEVEL**	**WORKING AT GREATER DEPTH**
• Sort and group animals based on their features, using examples as a guide. • Describe Carl Linnaeus and his development of his classification system. • Place animals into given groups based on certain characteristics. • Design a creature with a specific set of characteristics, using prompts and a word grid. • Name types of microorganism. • Set up an investigation into harmful microorganisms. • Design a microorganism using given characteristics. • Complete descriptions on the characteristics of groups of organisms, using images as prompts.	• Give reasons for the classification of animals, using examples as a guide. • Classify living things using the Linnaean system. • Match groups of animals to their characteristics. • Classify creatures based on their characteristics. • Design a creature that has a specific set of characteristics, using prompts. • Describe the useful and harmful effects of different microorganisms. • Identify the variables in an investigation into harmful microorganisms. • Draw conclusions based on their results. • Describe the characteristics of different microorganisms. • Describe the characteristics of groups or organisms, using images as prompts.	• Explain how living things are classified at each level of the Linnaean system. • Design a creature that has a specific set of characteristics. • Explain their predictions and conclusions in an investigation into harmful microorganisms. • Describe and compare the structure of the cells of different organisms. • Describe the characteristics of groups of organisms.

EVOLUTION AND INHERITANCE

KNOWLEDGE & UNDERSTANDING

- 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

- Identify that most living things live in habitats to which they are suited and describe how different habitats provide for the basic needs of different kinds of animals and plants, and how they depend on each other. (Y2 -Living things and their habitats)
- Notice that animals, including humans, have offspring which grow into adults. (Y2 - Animals, including humans)
- Explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal. (Y3 - Plants)
- Describe in simple terms how fossils are formed when things that have lived are trapped within rock. (Y3 - Rocks)
- Recognise that environments can change and that this can sometimes pose dangers to living things. (Y4 - Living things and their habitats)
- Describe the life process of reproduction in some plants and animals. (Living things and their habitats - Y5)

Future Learning

- Heredity as the process by which genetic information is transmitted from one generation to the next. (KS3)
- A simple model of chromosomes, genes and DNA in heredity, including the part played by Watson, Crick, Wilkins and Franklin in the development of the DNA model. (KS3)
- The variation between species and between individuals of the same species means some organisms compete more successfully, which can drive natural selection. (KS3)
- Changes in the environment may leave individuals within a species, and some entire species, less well adapted to compete successfully and reproduce, which in turn may lead to extinction. (KS3)

Common Misconceptions

Some children may think:

- adaptation occurs during an animal's lifetime: giraffes' necks stretch during their lifetime to reach higher leaves and animals living in cold environments grow thick fur during their life
- offspring most resemble their parents of the same sex, so that sons look like fathers
- all characteristics, including those that are due to actions during the parent's life such as dyed hair or footballing skills, can be inherited
- cavemen and dinosaurs were alive at the same time.

Vocabulary

Tier 1:
offspring, vary, suited, adapt, environment, inherited, evolve, evolution
Tier 2:
adaptation, characteristics, species, variations
Tier 3:
adaptive traits, inherited traits, natural selection

Enquiry Skills

ASSESSMENT STATEMENTS		
WORKING TOWARDS	**WORKING AT EXPECTED LEVEL**	**WORKING AT GREATER DEPTH**
• Identify inherited traits and adaptive traits. • Understand that adaptations are random mutations. • Examine fossil evidence supporting the idea of evolution. • Identify the difference between selective and crossbreeding.	• Develop an understanding of the development of evolutionary ideas and theories over time. • Explain how human evolution has occurred and compare modern humans with those of the same genus and family. • Understand that adaptation and evolution is not a uniform process for all living things. • Give examples of selective and crossbreeding.	• Explain the terms adaptation, evolution and natural selection and use these in context. • Describe how living things evolve via the process of natural selection. • Explain in simple terms what genes and DNA are. • Investigate the ethical issues of human intervention in the process of evolution by natural selection.

ELECTRICITY AND CIRCUITS

KNOWLEDGE & UNDERSTANDING

- 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)

Common Misconceptions	Vocabulary	Enquiry Skills

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.	**Tier 1:** circuit, complete circuit, circuit diagram, circuit symbol, cell, battery, bulb, buzzer, motor, switch **Tier 2:** voltage, amps **Tier 3:** electrons, resistance	

ASSESSMENT STATEMENTS		
WORKING TOWARDS	**WORKING AT EXPECTED LEVEL**	**WORKING AT GREATER DEPTH**
• know the main circuit symbols and use these to draw circuit diagrams • be able to plan and conduct an investigation. • plan an investigation based on the results of a previous investigation • decide how to record data	• explain how our understanding of electricity has changed over time • draw circuit diagrams using the correct symbols and label the voltage correctly • decide which variables to control while planning an investigation • decide how to report their findings • make new predictions based on the previous results • select an appropriate scientific enquiry	• explain how major discoveries led to the widespread use of electricity • explain the effect of increasing or decreasing the voltage on different parts of a circuit • explain how they have ensured a high degree of trust in their results variations in component function.

LIGHT – How does it travel?

KNOWLEDGE & UNDERSTANDING

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

Prior Learning	Future Learning
• Recognise that they need light in order to see things and that dark is the absence of light. (Y3 - Light) • Notice that light is reflected from surfaces. (Y3 - Light) • Recognise that light from the sun can be dangerous and that there are ways to protect their eyes. (Y3 - Light) • Recognise that shadows are formed when the light from a light source is blocked by an opaque object. (Y3 - Light)	• The similarities and differences between light waves and waves in matter. (KS3) • Light waves travelling through a vacuum; speed of light. (KS3) • The transmission of light through materials: absorption, diffuse scattering and specular reflection at a surface. (KS3)

• Find patterns in the way that the size of shadows change. (Y3 - Light) • Compare and group together everyday materials on the basis of their properties, including their hardness, solubility, transparency, conductivity (electrical and thermal), and response to magnets. (Y5 - Properties and changes of materials	• Use of ray model to explain imaging in mirrors, the pinhole camera, the refraction of light and action of convex lens in focusing (qualitative); the human eye. (KS3) • Light transferring energy from source to absorber leading to chemical and electrical effects; photo-sensitive material in the retina and in cameras. (KS3) • Colours and the different frequencies of light, white light and prisms (qualitative only); differential colour effects in absorption and diffuse reflection. (KS3)

Common Misconceptions	Vocabulary	Enquiry Skills
Some children may think: • we see objects because light travels from our eyes to the object	**Tier 1:** light, light source, shadow, transparent, translucent, opaque **Tier 2:** ray, prism, reflection **Tier 3:** incident ray, reflected ray, the law of reflection, refraction, visible, spectrum	  

ASSESSMENT STATEMENTS

WORKING TOWARDS	WORKING AT EXPECTED LEVEL	WORKING AT GREATER DEPTH
• Recognise that light travels in straight lines. • Describe how light enables us to see. • Understand reflection as light bouncing off a surface. • Identify some effects of refraction. • Identify the visible spectrum. • Explore colours using light. • Recognise that Isaac Newton discovered information about light and colour. • Explain that objects block light to form shadows. • Predict what will happen in an investigation. • Make observations.	• Explain how light travels to enable us to see. • Understand that all objects reflect light. • Identify the angles of incidence and reflection. • Understand refraction as light bending or changing direction. • Explain how a prism allows us to see the visible spectrum. • Understand that colours are a result of light reflecting off an object. • Explain Isaac Newton's experiments about light and colour. • Understand how shadows change size.	• Explain how light enables us to see an object reflected in a mirror. • Recognise that the angles of incidence and reflection are equal. • Explain how light is refracted as it travels through glass or water. • Recognise that the colours of the visible spectrum have different wavelengths. • Understand how filters reflect or absorb different colours of light. • Recognise how Isaac Newton used proof to support his ideas about light and colour. • Set up reliable and accurate investigations.

	• Understand that shadows are the same shape as the object that casts them. • Make observations and conclusions. • Be able to answer questions based on their learning.	• Make and explain predictions. • Make and record accurate observations. • Use scientific language to explain their findings. • Be able to ask and answer questions based on their learning using scientific language.