Science Progression Document (Pembroke Park)

"The scientist is not a person who gives the right answers,

he's one who asks the right question."

(Claude Levi-Strauss)

How is this subject taught and why?

It is our intent in Science to develop in all young people a lifelong curiosity and interest in the sciences. When planning for the science curriculum, we intend for children to have the opportunity, wherever possible, to learn through varied systematic investigations, leading to them being equipped for life to ask and answer scientific questions about the world around them. As children progress through the year groups, they build on their skills in working scientifically, as well as on their scientific knowledge, as they develop greater independence in planning and carrying out fair and comparative tests to answer a range of scientific questions.

The acquisition of key scientific knowledge is an integral part of our science lessons. The progression of skills for working scientifically are developed through the year groups and scientific enquiry skills are of key importance within lessons. Each lesson has a clear focus. Scientific knowledge and enquiry skills are developed with increasing depth and challenge as children move through the year groups. They complete investigations and hands-on activities while gaining the scientific knowledge for each unit. Interwoven into the teaching sequence are key assessment questions, identified in green on lesson plans. These allow teachers to assess children's levels of understanding at various points in the lesson. They also enable opportunities to recap concepts where necessary. The sequence of lessons helps to embed scientific knowledge and skills, with each lesson building on previous learning. There is also the opportunity to regularly review and evaluate children's understanding.

Rationale for using a "scheme of learning

In line with our Science scheme we believe that 'children should be taught science in a way that helps nurture an understanding of the value of scientific skills. We think science learning should be engaging and inspiring.'

White Rose Science uses a "small steps" approach to science teaching, and closely follows the national curriculum for science for years 1 - 6. It gives specialist and non-specialist teachers a one stop solution as they help children develop scientific understanding and grasp scientific ideas.

White Rose Science teaches practical approaches to science and scientific language in a fun and logical way.

At the same time, it provides teachers with all the guidance and supporting materials they need to plan and deliver a high-quality science education. Comprehensive training courses support the implementation of White Rose Science in schools.

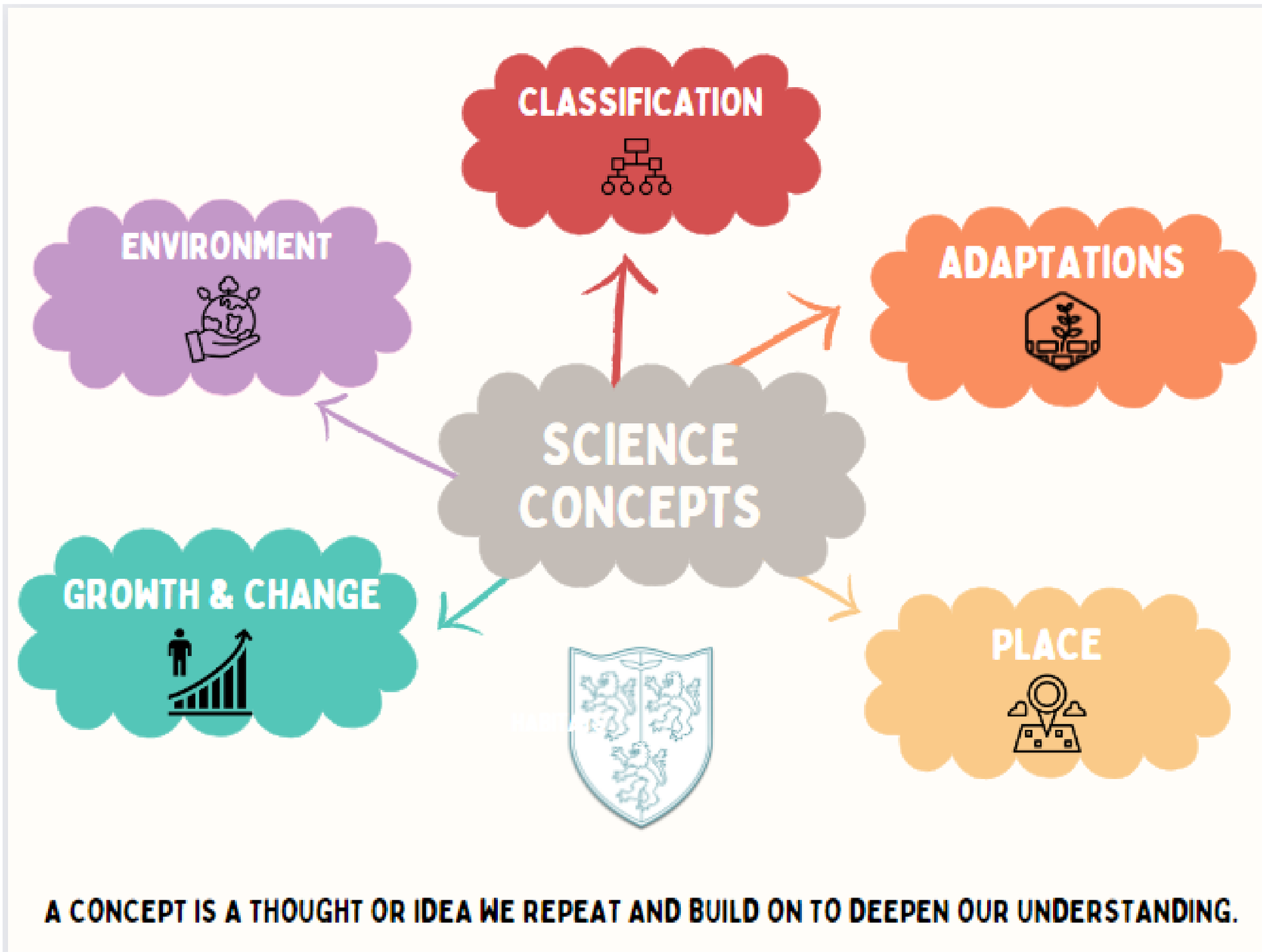
Our schemes of learning provide full coverage of the national curriculum for science but don't stop there. They also cover scientific questions around sustainability and the planet, and help children develop an empathy for the local and wider environment.

The key to the success of White Rose Science is our small steps approach. We break down the essential aspects of key stage science into easily digestible chunks.

Through experiment, practice and discussion, children gain core knowledge around:

- Scientific vocabulary
- 'Working scientifically' skills including systematic and careful observations and following practical scientific methods
- The gathering and interpretation of straightforward scientific evidence
- The use of everyday materials and scientific equipment to solve science problems
- Articulating scientific concepts and using five types of science enquiries

As White Rose Science is a new scheme they are releasing material each new term. This will be added to the progression document as it is released.


CLASSIFICATION
ENVIRONMENT
ADAPTATIONS
SCIENCE CONCEPTS
GROWTH & CHANGE
PLACE
A CONCEPT IS A THOUGHT OR IDEA WE REPEAT AND BUILD ON TO DEEPEN OUR UNDERSTANDING.

Long term Plan

Building on to/links to previous learning

	Term 1	Term 2	Term 3	Term 4	Term 5	Term 6
EYFS	**EYFS 1** Use all their senses in hands-on exploration of natural materials **EYFS 2** Children will use mirrors to observe and draw themselves. They will identify and name facial features. Children can name and identify the five senses they have which help them understand information from the world around us. Children can name some foods that we grow and harvest for food.	**EYFS 1** Talk about what they see, using a wide vocabulary Begin to understand the need to respect and care for the natural environment and all living things. **EYFS 2** Children explore the natural world around them. They will learn to describe what they see, hear and feel whilst outside. Children can name the four seasons. Children can talk about changes they can see in autumn during welly walks and scavenger hunts. Children can talk about how to dress appropriately for the weather. Children will be able to name some animals that can be found on or near our school grounds.	**EYFS 2** Children can talk about changes they can see in winter during welly walks and scavenger hunts. Children will know that there are special people who help us stay healthy through life; midwives, doctors, nurses, dentists, firefighters etc. Children will learn how to practice being a safe pedestrian. Children can talk about how to dress appropriately for the weather. Children will foster curiosity touching, smelling and listening and looking at the natural world around them during hands-on experiences.	**EYFS 1** Explore collections of materials with similar and/or different properties. Explore how things work. **EYFS 2** Children can talk about changes they can see in spring during welly walks and scavenger hunts. Children can use their senses to describe different materials. Children will use their knowledge of different materials to design their own houses for the three little pigs. Children will talk about pets at home and animals on farms and suggest similarities and differences between the animals, their needs. Children will know all animals need food, water and shelter (somewhere safe to live). Children know how to care for animals.	**EYFS 1** Plant seeds and care for growing plants. Understand the key features of the life cycle of a plant and an animal. **EYFS 2** Children can talk about changes they can see in summer during welly walks and scavenger hunts. Children will identify and name some body parts. Children will know that humans begin life as babies and grow through different stages of life. Life cycles; Children can name some parts of a plant and know some plants are grown from seeds. Children can care for plants by giving them water, soil and light. Children can talk about similarities and differences, patterns and changes in relation to plants. Children can talk about the changes they observe watching caterpillars grow and transform into butterflies. Children can talk about the growth of frogs from spawn. Children know they should care for the natural environment and all living things and can suggest ways to do it. Children can suggest ways to help look after our planet. They will begin to understand the effect of changing seasons/climate on the natural world around them. Children can identify and name some animals from hot and cold places and suggest why they are suited to their home. Children know that weather can be different in different countries.	**EYFS 1** Explore and talk about different forces they can feel. Talk about the differences between materials and changes they notice. **EYFS 2** Children can talk about ways to stay safe in the sun. Children can talk about different factors that support overall health and wellbeing such as: regular physical activity, healthy eating, toothbrushing, hand washing, sensible amounts of screen time, having a good sleep routine. Children will observe and interact with natural processes, such as ice melting, a sound causing a vibration, light travelling through transparent material, an object casting a shadow, a magnet attracting an object and floating and sinking. Children know that some things can change, e.g. water into ice, chocolate can be melted, etc. Ice melting experiment. Children know that shadows are an absence of light.

Y1	The Human Body (5 week) Seasonal changes (1 week)	Materials (5 weeks) Seasonal Changes (1 week)	Planting (1 week) Animals (5 weeks)	**Caring for the Planet (2 weeks) Seasonal changes (1 week) Planting (1 week)	Plants (5 weeks) Planting (1 week)	**Growing and Cooking (3 weeks) Seasonal Changes (1 week)
Y2	Animals needs for survival (4 weeks) Humans (2 weeks)	Materials (5 weeks) Plastic (1 week)	Plants (3 weeks) Living things & their Habitats (7 weeks) Light & Dark (1 week)		Plants (2 weeks) Growing up (4 weeks)	Plants (1 weeks) Growing up (1 week) ** (2 weeks)
Y3	Skeletons (3 weeks) Movement (1 week) Nutrition and diet (3 weeks)	Food waste (1 week) Rocks (3 weeks)	Fossils (2 weeks) Soils (3 weeks)	Light (6 weeks)	Plants (6 weeks)	Forces (2 weeks) Magnets (2 weeks) Plants (1 week) **Bio diversity (1 week)
Y4	Group & classify living things (3 weeks) Data collection (1 week) States of Matter (2 weeks)	States of Matter (5 weeks)	Sound (5 weeks) Data Collection (1 week)	Electricity (4 weeks) Energy (1 week)	Data collection (2 weeks) Habitats (2 weeks) Deforestation (1 week) Digestive System (2 weeks)	Digestive system (3 weeks) Food chains (2 weeks)
Y5	Forces (5 weeks)	Space (5 weeks) Global Warming (1 week)	Properties of Materials (4 weeks) Animals incl Humans (2 weeks)	-Animals incl Humans (3 weeks) Life Cycles (3 weeks)	Reproduction A (3 weeks) Reversible & Irreversible changes (2 weeks)	Reversible & Irreversible changes (2 weeks) **Plastic Pollution (1 week) Reproduction (2 weeks)
Y6	Living things and their habitats (6 weeks)	Electricity (5 weeks) Renewable energy (1 week)	Light (5 weeks) **(Light pollution (1 week)	Circulatory System (3 weeks) Diet, Drugs, Lifestyle (3 weeks)	Variation (2 weeks) Adaptation (4 weeks)	Fossils (2 weeks) **Themed project**

Year 1 LESSON OVERVIEWS (Declarative & Procedural knowledge)

Curriculum links – Identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense.

Working scientifically (Procedural knowledge)
Asking simple questions and recognising that they can be answered in different ways.

Using their observations and ideas to suggest answers to questions.

Perform simple tests.

Year 1 - The Human Body	Declarative(sticky) Knowledge	Possible misconceptions	Vocabulary
Session 1	**Name and identify parts of the human body** The body has lots of parts Each of these body parts has a name Most bodies have a neck, arm, elbows, legs, knees, face, ears, eyes, hair, mouth and teeth	-Children may think that age determines height. -Children may use different names for the same body part. For example, the area between the chest and hips can be called the stomach, tummy or belly.	Neck Arm Elbows Legs Knees Face Ears Eyes Hair Mouth Teeth
Session 2	**Draw and label parts of the human body** The body has lots of parts Each of these body parts has a name Most bodies have a neck, arm, elbows, legs, knees, face, ears, eyes, hair, mouth and teeth	-Children may struggle to identify who is older/younger. Create a line from oldest to youngest to support them with this. -Children may find it difficult to spot patterns in data. Sort the footprints from longest to shortest. Match these to the line order of the children.	
Session 3	**Sight** Humans use their eyes to see You can see when there is light You cannot see in the dark Some people cannot see	-Children may not have experienced true darkness and therefore think humans can see in the dark. -Some children may think that sight is not affected when one eye is covered. Ask children to say what they can see when one eye is covered compared to their full vision. -Children may not recognise that some people cannot see and are therefore blind.	eyes – the parts of the body people see with light – something that allows people to see dark – where there is no light blind – when a person cannot see **ears** – The parts of the body that people hear with.
Session 4	**Sound** Humans use their eyes to see. You can see when there is light. You cannot see in the dark. Some people cannot see.	-Children may have limited vocabulary to describe sound. This may need to be taught before they complete the practical tasks. -Children may think that they can only hear one sound at once. Encourage children to identify how many different sounds they can hear at once when conducting sound walks. -Children may not recognise that some people cannot hear or have different levels of what they can hear.	**hear** – When we listen to sounds. l**oud** – When sound is easy to hear. q**uiet** – When sound is hard n**oisy** – When a lot of loud sounds can be heard.

Session 5	**Taste** The tongue helps humans to taste. The tongue is in the mouth. There are five basic tastes – sweet, salty, sour, bitter and savoury.	-Children may think that the hand is the only body part that can sense touch. -Children may have limited vocabulary to describe touch, this may need to be taught before they complete the practical tasks.	**sweet** – A taste similar to sugar. s**alty** – A food that contains salt. s**our** – A food with a sharp taste. b**itter** – A sharp and sometimes unpleasant taste. s**avoury** – A taste that is not sweet.
Session 6	**Touch** The skin is the body part that helps us to sense touch. Skin covers the whole body. We can sense touch using different body parts.	-Children may think that the hand is the only body part that can sense touch. -Children may have limited vocabulary to describe touch, this may need to be taught before they complete the practical tasks.	**skin** – The part of the body that senses touch. All skin feels. r**ough** – An uneven surface. s**mooth** – An even surface. h**ard** – A material that does not bend or stretch easily. s**oft** – A material that does not feel rough or hard
Session 7	**Smell** The nose helps us to sense smell. The nose is on the face. Some items have a stronger smell than others.	-Children may not be able to recognise that there are a range of different smells. For example, some may be pleasant or unpleasant. Introduce children to a range of smells, including those with strong odours such as garlic, onion or lavender. -Children may have limited vocabulary to describe smell. This may need to be taught before they complete the practical tasks.	**nose** – The part of the body used to smell. s**mell** – To sense something through the nose. s**cent** – A smell left by an object. **Sniff** – To breathe in a smell. s**tench** – A strong, unpleasant smell.

Year 1 LESSON OVERVIEWS (Declarative & Procedural knowledge)

Curriculum links – Observe changes across the four seasons/ Observe and describe weather associated with the seasons and how day length varies.

Working scientifically (Procedural knowledge)
Asking simple questions and recognising that they can be answered in different ways.

Gathering and recording data to help in answering questions.

Year 1 - Seasonal Changes	Declarative(sticky) Knowledge	Possible misconceptions	Vocabulary
Session 1 – Term 1	**Changes in Autumn** There are four seasons in one year. The seasons are spring, summer, autumn and winter. In autumn, the days are starting to become shorter, and the nights are starting to become longer. Some trees lose their leaves in autumn	Children may think that if the leaves fall from a tree then the tree is dead. They should understand that it is a process that happens to some trees annually	season – A part of the year. autumn – The season after summer and before winter daylight – When it is light outside night – When there is no daylight. weather – The conditions outside.
Session 2 – Term 1	**Collect and record data** There are four seasons in one year – spring, summer, autumn, and winter. In autumn, the days are starting to become shorter, and the nights are starting to become longer. The weather changes often in autumn.	Children may have preconceptions about weather patterns in certain seasons. Allow children to record the weather over a week to challenge any misconceptions they may have. Children may find it difficult to identify that the amount of daylight changes throughout a year. Link this with the idea that it is becoming darker when they wake up and as they leave school.	Autumn – The season after summer and before winter. rainfall – The amount of rain that falls in one place rain gauge – An object used to collect rainfall. weather – The conditions outside.
Session 1 - Term 2	**Changes in Winter** There are four seasons in one year. The season names are spring, summer, autumn and winter. In winter, there are fewer hours of daylight and the nights are longer. The weather is often colder in winter.	Children may think that all plants and trees are dead during winter. Children may think it always snows in winter	season – a part of the year winter – the season after autumn and before spring daylight – natural light from the Sun weather – the conditions outside – weather changes daily night – a period of darkness each day when there is no daylight

Session 2 – Term 2	**Gather and Record data** There are four seasons in one year – spring, summer, autumn and winter. In winter, there are fewer hours of daylight and the nights are longer	Children may have preconceptions about weather patterns in certain seasons. Allow children to record the weather over a week to challenge any misconceptions they may have. Children may find it difficult to identify that the amount of daylight changes throughout a year. Link this with the idea that it is becoming darker as they leave school and when they wake up.	rain cloud frost sun snow
Session 1 - Term 4	**Changes in Spring**		
Session 2 – Term 4	**Gather and Record data**		
Session 1 – Term 6	**Changes in Summer**		
Session 2 – Term 6	**Gather and Record data**		
Session 3- Term 6	**What are the main changes in each season?**		

Year 1 LESSON OVERVIEWS (Declarative & Procedural knowledge)

Curriculum links – Describe the simple physical properties of a variety of everyday materials.
Identify and name a variety of everyday materials, including wood, plastic, glass, metal, water and rock.
Distinguish between an object and the material from which it is made.
Compare and group together a variety of everyday materials on the basis of their simple physical properties.

Working scientifically (Procedural knowledge) – Identifying and classifying.

Year 1 – Materials	Declarative(sticky) Knowledge	Possible misconceptions	Key questions	Vocabulary
Session 1	**Explore materials – wood, plastic, glass and metal** Objects are made from different materials. Materials can have different textures	Children may think that materials can only be sorted in one way. Children may focus on sorting based on the material only. Encourage children to think about other categories for sorting such as texture, size or mass.	What material is this? How can we describe this material? What is the same about these materials? What is different about these materials? How can we sort these materials? Which object belongs in this group? Which object does not belong in this group? Why does it not belong in this group? How many ways can you think of to sort these materials?	material – what an object is made from soft – a material that can easily change shape or is gentle to touch hard – not easily broken or bent shiny – a smooth surface that can reflect light easily dull – not clear, bright or shiny

Session 2	**Explore material – rock** There are different types of rocks. Rocks come in different shapes, sizes and textures. Rocks can also be used to build things such as walls or buildings	Children may think that all rocks have the same properties, such as colour or texture. Show the children a range of examples of rocks to address this misconception. Some children may not recognise that rocks can be shaped and used as a material in everyday life, such as in buildings.	Is_____ made from rock? How can you describe the texture of this rock? Why is rock a good material for? What is the same about these rocks? What is different about these rocks? How can we sort these rocks? Which rock is heavier? Which rock is lighter? What can you see when you look at this rock closely?	rock heavy – difficult to lift light – easy to lift heavy light rough – an uneven surface to touch smooth – an even surface to touch
Session 3	**Objects and materials** Objects are made from different materials. Some objects can be made from different materials depending on what they are used for.	Children may not be able to tell the difference between an object and the material it is made from. Some children may think certain objects are always made from the same material, for example, all spoons are made from metal. Children may have limited vocabulary to describe objects and materials. This may need to be revised before they complete the practical tasks.	What is this object? What material is it made from? Can you find another object that is made from? How can we sort these objects? How else can we sort the objects? What is similar about these objects? What is different about these objects? How have these objects been sorted? How else can you sort the same objects	Object – something that can be seen and touched Material – what an object is made from metal wood plastic glass rock wool
Session 4	**Melt and freeze** When water freezes, it turns to ice. When ice melts, it turns to water	Children may not recognise that melting and freezing are reversible changes. Children may think that water is not a material as it is not a solid like other materials they have explored in this block.	How are water and ice similar? How are water and ice different? What happens to ice when it is heated? What happens to water when it is put in the freezer? How can we change this water to ice? How could we remove this toy from the ice block? What could we use to help? What other ways can you think of to melt the ice? Which was the quickest way to melt the ice?	solid liquid melt – when a solid changes to a liquid Freeze – when a liquid changes to a solid Ice – when water freeze
Session 5	**Float or Sink** Some materials float in water. This means they stay at the top. Some materials sink in water. This means they fall to the bottom	Children may think the larger an object is, the more likely it is to sink. Ensure children have a selection of objects of different sizes and masses to avoid this. Some children may think that objects made of the same type of material will all sink or float.	What does “float” mean? What does “sink” mean? Do you think this object will float or sink? Why do you think these objects will float or sink? How would you know if an object is floating? How would you know if an object has sunk? Can you sort these objects into those you think will float and sink? Was your sorting correct? Can you sort the objects again into groups depending on whether they float or sink?	material – what an object is made from float – when an object stays on top of the water sink – when an object falls to the bottom of the water heavy – difficult to lift light – easy to lift heavy

Session 6	**Does it absorb water?** **Experiment**	Children may think that if the water is absorbed by the material, then it has disappeared. Include materials that do not absorb water at all so children can see that the water remains if it is not absorbed.	What material is this? What does the material feel like? Do you think this material will absorb water? Which material will absorb the most water? Why? Which material will absorb the least water? Why? What will we keep the same each time? What is different each time?	absorb – when liquid is taken in by a material Independent variable (what will change) – the type of material used. dependent variable (what will be measured) – children will observe whether the material absorbs the water or not. controlled variables (what is kept the same) – the size of the material, the amount of water used and the time before checking to see if the water has been absorbed.

Year 1 LESSON OVERVIEWS (Declarative & Procedural knowledge)

Curriculum links –
Identify and describe the basic structure of a variety of common flowering plants, including trees. • Working scientifically − Asking simple questions and recognising that they can be answered in different ways.

Working scientifically (Procedural knowledge)

Year 1 – Planting A	**Declarative(sticky) Knowledge**	**Possible misconceptions**	Key Questions	**Vocabulary**
Session 1 – Term 3	**Plant – Winter** A plant is a living thing that usually grows in soil. Some plants have roots, a stem, leaves and flowers. A seed can be planted to grow into a new plant. Some seeds can be planted in winter but must be kept warm to grow	Children may think that all plants die in the winter months. Explain that it is more difficult for plants to grow during winter as it is colder.	Where are the roots/stems/leaves/flowers? What equipment will you use to plant the seeds? Where will you keep the planted seeds? What will happen to the seeds over time? How often will you look for any changes? What will your plant look like in one week/two weeks/ three weeks? Why have you kept your plant inside during winter?	plant – a living thing that usually grows in soil seed – a part of a plant that can grow into a new plant
Year 1 – Planting B				
Session 1 – Term 4	**Observe changes**			
Session 2 – Term 4	**Plant B**			
Year 1 – Planting C				

Session 1 – Term 5	**Observe changes**			
Session 2 – Term 5	**Plant – Summer**			

Year 1 LESSON OVERVIEWS (Declarative & Procedural knowledge)

Curriculum links –
Identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals.

Working scientifically (Procedural knowledge)
Asking simple questions and recognising that they can be answered in different ways
Using their observations and ideas to suggest answers to questions.
Gathering and recording data to help in answering questions.
Identifying and classifying

Year 1 – Animals	**Declarative(sticky) Knowledge**	**Possible misconceptions**	Key Questions	**Vocabulary**
Session 1	**Mammals** Mammals have fur or hair on their bodies. Some mammals can be kept as pets. Some mammals live in the wild.	Children may think, for example, that a mouse and an elephant cannot both belong to the category of mammals due to their distinct physical differences. Children may assume all mammals can be kept as pets and not live in the wild.	What is a mammal? What mammals are shown? How do you know? Does a have fur? Can all mammals be pets? How do you know? Can all mammals live in the wild? How do you know?	animal – a living creature mammal – an animal with fur or hair on its body fur – the fine, soft hair found on different animals wild mammal – a mammal that is not looked after by humans pet – an animal that is looked after by humans
Session 2	**Birds** Birds have beaks, wings and feathers. Some birds can fly. Some birds cannot fly. Some birds can swim. Some birds cannot swim	Children may think all birds can fly. Children may think fur and feathers are the same thing, as they both feel soft. Children may think all animals with wings are birds	What features do all birds have? Is a_____ a bird? How do you know? Does a have feathers? Can all birds fly? How do you know? What birds are shown? Which birds can swim? What are the differences between these two birds	bird – an animal that has feathers, wings and a beak wings – a part of a bird's body that can be used for flying feathers – the soft covering on the outside of the bird webbed feet – fingers and toes that are joined together to help with swimming flipper – the part of the body some birds use to swim

Session 3	**Fish** Fish live in water. Some fish have scales on their bodies. Fish have fins to help them swim. Most fish have gills that help them breathe underwater	Children may use the term “fish” to describe all animals that live in water. Children may think that fish do not breathe as they are underwater.	What features do fish have? What fish are shown? Is a_____ a fish? What do fish have to help them swim? What do fish have to help them breathe underwater? How is a fish different from a mammal? How is a fish similar to a bird	fish – an animal that lives in water which usually has fins, scales and gills tail – the end part of a fish that helps with swimming fin – body parts that help a fish to swim gills – help fish to breathe underwater scales – small layers that grow from the skin
Session 4	**Amphibians** Amphibians live on land and in water. Amphibians have webbed feet. Frogs, toads and newts are amphibians	Children may think that amphibians have scales like fish. Explore the differences between fish and amphibians to address this misconception. Children may assume penguins are amphibians as they spend part of their life in water	Is a_____ an amphibian? What features do amphibians have? What amphibian is this? Where do amphibians live? What are the differences between a fish and an amphibian? How is an amphibian similar to a mammal/bird/fish? How is an amphibian different from a mammal/bird/fish?	amphibian – an animal that lives on land and in water frog – an amphibian with moist, smooth skin toad – an amphibian with dry, bumpy skin newt – a small amphibian with a long tail webbed feet – fingers and toes that are joined together to help with swimming
Session 5	**Reptiles** Reptiles have dry skin. Reptiles have scales on their bodies. Lizards, snakes, crocodiles and turtles are reptiles	Children may think that all reptiles are small. Children may think that all reptiles live on land. Discuss examples of aquatic reptiles, such as crocodiles or turtles, to address this misconception. Children do not need to use the word “habitat” within this step	What features do reptiles have? What reptile is this? Is a_____ a reptile? What is similar about these two reptiles? What is different about these reptiles? Are there similarities between reptiles/mammals/birds/fish and amphibians? What are the differences between reptiles/mammals/birds/ fish and amphibians?	reptile – an animal that has dry scales scales – small, hard layers that grow from the skin lizard – a small reptile crocodile – a large reptile turtle – a reptile with a shell
Session 6	**Compare and group animals** There are different types of animals. Animals have different features	Children may group animals incorrectly. Revisiting the features of different types of animals will address this. Children may think all animals that live in water are fish. Be sure to include animals such as penguins and turtles to avoid this assumption	What animal is this? What features do have? How can you group these animals? What is similar about these groups of animals? What is different about these groups of animals? What is similar about mammals/birds/fish/amphibians and reptiles? What is different about mammals/birds/fish/amphibians and reptiles? How do you know a_____ is a_____?	mammal – an animal with fur or hair on its body bird – an animal that has feathers, wings and a beak fish – an animal that lives in water which usually has fins, scales and gills amphibian – an animal that lives on land and in water reptile – an animal that has dry scales
Session 7	**Carnivores** Some animals are carnivores. Carnivores eat other animals. Many carnivores have sharp teeth and claws.	Children may think that only mammals can be carnivores. Sorting carnivores into their different animal groups will address this misconception. Children may assume carnivores can only be large animals.	What is a carnivore? Is a_____ a carnivore? How do you know? What do carnivores eat? What animals does a_____ eat? Do all carnivores live in the wild? How do you know? Are there any pets that are carnivores? What animal group does this carnivore belong to? Are there any reptiles/birds/amphibians/fish that are carnivores?	animal – a living creature carnivore – an animal that eats other animals sharp teeth – teeth used for ripping and tearing wild animal – an animal that is not looked after by humans pet – an animal that is looked after by humans

Year 1 LESSON OVERVIEWS (Declarative & Procedural knowledge)

Curriculum links –

Working scientifically (Procedural knowledge)

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Year 1 – Caring for the Planet	**Declarative(sticky) Knowledge**	**Possible misconceptions**	**Vocabulary**
Session 1 – Term 4	**Why is it important to care for our planet?**		
Session 2 – Term 4	**How can we care for our planet?**		

Year 1 LESSON OVERVIEWS (Declarative & Procedural knowledge)

Curriculum links –

Working scientifically (Procedural knowledge)

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Year 1 – Plants	**Declarative(sticky) Knowledge**	**Possible misconceptions**	**Vocabulary**
Session 1	**Plant Parts**		

Session 2	**Tree Parts**		
Session 3	**Wildflower & Garden plants**		
Session 4	**Plants in my local area**		

Year 1 LESSON OVERVIEWS (Declarative & Procedural knowledge)

Curriculum links –

Working scientifically (Procedural knowledge)

Year 1 –Growing & Cooking	**Declarative(sticky) Knowledge**	**Possible misconceptions**	**Vocabulary**
Session 1	**Where does my food come from?**		
Session 2	**What have I planted and grown this year?**		
Session 3	**Can I cook with what I have grown?**		

Year 2 LESSON OVERVIEWS (Declarative & Procedural knowledge)

Curriculum links –
Find out about and describe the basic needs of animals, including humans, for survival (water, food and air).

Working scientifically (Procedural knowledge)
Asking simple questions and recognising that they can be answered in different ways.
Gathering and recording data to help in answering questions.
Identifying and classifying.
Using their observations and ideas to suggest answers to questions.

Year 2 – Animals needs for survival	Declarative (sticky) Knowledge	Possible misconceptions	Key Questions	Vocabulary
Session 1 **Sustainability Link:** What can we do to help care for mammals?	**Mammals** Mammals have fur or hair on their bodies. All mammals need air, water, food and shelter to survive. Mammals are carnivores, herbivores or omnivores.	Children may think that all mammals live on land. Discuss whales and dolphins to help address this misconception. Children may need support when thinking about dietary needs for different mammals.	What mammals are shown? Do all mammals live on land? How do you know? What do all mammals need to survive? What does a carnivore eat? What does a herbivore eat? What does an omnivore eat? How do mammals that live in water breathe air	**mammal** – An animal with hair or fur on its body. f**ur** – The fine, soft hair found on different animals. c**arnivore** – An animal that eats other animals. h**erbivore** – An animal that eats plants. o**mnivore** – An animal that eats plants and other animals.
Session 2 **Sustainability Link:** What can we do to help care for birds?	**Birds** Birds have feathers, wings and beaks. Some birds can fly. Some birds cannot fly. Birds need air, water, food and shelter to survive.	When talking about the dietary requirements of birds, children may use the word “insect” to describe all minibeasts. Worms, slugs and spiders are not classified as insects. Children do not need to know this factual knowledge until Year 4, but “insect” should not be used as a general term to describe all minibeasts.	What birds are shown? What features do all birds have? What are the differences between these two birds? What does an insectivore eat? Is a _____ a carnivore or a herbivore? What do birds need to survive? How are the needs of birds similar to the needs of mammals?	**bird** – An animal with feathers, wings and a beak. **feathers** – The soft covering on the outside of birds. **beak** – The hard, pointed part of a bird’s mouth and nose. **insect** – A small animal that has three body sections and six legs. **insectivore** – An animal that eats insects, worms and spiders.

Session 3	**Fish** Fish are animals that live in water. Fish need air, water, food and shelter to survive. Fish have gills that they use to breathe.	Children may use the term “fish” to describe all animals that live in water. They may think that fish do not breathe as they are underwater. When grouping, children may sort animals into mammals, fish and birds rather than on their needs for survival.	Is a _____ a fish? How do you know? What features do fish have? What do fish need to survive? What do other animal groups need to survive? How are these animals’ needs similar? How are they different?	**amphibian** – An animal that lives on land and in water. w**ebbed feet** – Toes that are joined together to help with swimming. f**rog** – A small amphibian with moist, smooth skin. t**oad** – A small amphibian with dry, bumpy skin. n**ewt** – A small amphibian with a long tail.
Session 4	**Amphibians** Amphibians live on land and in water. Amphibians do not have scales on their bodies. Some amphibians have webbed feet. Amphibians need air, water, food and shelter to survive.	Children may think that amphibians have scales or gills like fish. They may need support to group animals based on their needs for survival. Provide structure to help them sort correctly. For example, “All animals need air. Sort these animals based on whether they breathe underwater or not.”	Is a _____ an amphibian? How do you know? What features do amphibians have? What do amphibians eat? What do amphibians need to survive? What do other animal groups need to survive? How are these animals’ needs similar? How are they different?	**amphibian** – An animal that lives on land and in water. w**ebbed feet** – Toes that are joined together to help with swimming. **Frog** – A small amphibian with moist, smooth skin. t**oad** – A small amphibian with dry, bumpy skin. n**ewt** – A small amphibian with a long tail
Session 5	**Reptiles** Reptiles have dry scales on their bodies. They need air, water, food and shelter to survive. Reptiles need direct heat to survive.	Children may think that all reptiles are small. They may think that reptiles do not inhabit the United Kingdom. Continue to provide structure to support children to group animals based on their needs for survival and not physical features.	Is a _____ a reptile? How do you know? What features do reptiles have? What is similar about these two reptiles? What is different? What do reptiles need to survive? What do other animal groups need to survive?	**reptile** – An animal with dry scales on its body**.** **scales** – Small, hard layers that grow from the skin. c**arnivore** – An animal that eats other animals. h**erbivore** – An animal that eats plants.
Session 6	**Humans** A mammal has fur or hair on its body. Humans are mammals. Humans need air, water, food and shelter to survive. All animals need air, water, food and shelter to survive.	Children may sort and group animals based on physical features rather than their needs for survival. As a class, recap the similarities and differences between each animal group. They can then use this information to help them sort and group correctly. Although they are noticing differences in how animals meet their basic needs for survival, children should identify that all animals need air, water, food and shelter to survive.	What is a mammal? Is a human a mammal? How do you know? What do babies need to survive? What do adults need to survive? How are the needs of humans similar or different from those of other animals	**mammal** – An animal with fur or hair on its body. **adult** – A human is a type of mammal. A fully grown human is called an **adult**. **baby** – A newborn human. **shelter** – A place that gives protection from weather or danger.

Year 2 LESSON OVERVIEWS (Declarative & Procedural knowledge)

Curriculum links –
Describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene.

Working scientifically (Procedural knowledge)
Gathering and recording data to help in answering questions.
Identifying and classifying
Observing closely, using simple equipment

Year 2 – Humans	Declarative (sticky) Knowledge	Possible misconceptions	Key Questions	Vocabulary
Session 1	**Exercise** Exercise improves physical health. Exercise improves mental health. Exercising daily makes your heart stronger	Children may think that exercise has a negative effect on the body as it can leave you feeling breathless. They may think that slower forms of exercise such as yoga or swimming are not classified as exercise. Children may think that their heart is a "love heart" shape. Show a picture or diagram of the human heart to address this.	Why is exercise good for your body? Why is exercise good for your mind? What happens to your body when you exercise? Make a prediction. Which form of exercise will raise your heart rate the most? Make a prediction. Which form of exercise will raise your heart rate the least? Which exercise raise your heart rate the most? Which exercise raised your heart rate the least? Was your prediction correct	heart – The muscle inside the chest which pumps blood around the body. exercise – Physical activities that make your body strong and healthy. physical health – Keeping your body healthy. mental health – Keeping your mind healthy
Session 2	**Food** A healthy diet includes fruit, vegetables and other healthy food. An unhealthy diet is a diet that is high in fat, sugar or fried food. It is important to eat the right amounts of different types of food	Children may think eating an unhealthy diet has no impact on the body. They may think that the food they enjoy is good for them regardless of fat or sugar content. Children may think that drinks have no effect on teeth or the body.	Should you eat _____ every day or only sometimes? Explain your thinking. How many pieces of fruit and vegetables should you eat per day? How can you sort these food items? How many ways can you think of? What could happen if you eat too much fat, sugar or salt? What is a healthy diet? Why is your meal healthy	healthy diet – A diet that includes fruit, vegetables and other healthy food. unhealthy diet – A diet that is high in fat, sugar or fried food. meat – Animals that are eaten for food. vegetables – A plant that is used for food. fruit – The part of a plant that has seeds and can be eaten as food. sugar – A sweet substance that comes from plants
Session 3	**Hygiene** Germs can make you unwell.	Children may find the concept of germs difficult to understand as they cannot be seen without a	What is a germ? Where can we find germs? Why should you wash your hands after using the toilet?	germs – Tiny living things that can cause illness. They cannot be seen by the human eye.

	Germs are spread easily from unwashed hands. You should wash your hands, sneeze into a tissue and have regular baths or showers	microscope. Use a substance to represent germs to show how easily they can be spread. They may think that washing their hands with water alone is enough to remove germs.	Why should you wash your hands before lunch? What else can you do to keep clean? Why is it important to keep clean? Why should you use a tissue when you sneeze? Who could help us if we become unwell	hygiene – Keeping yourself and your surroundings clean. disease – Illness or sickness. doctor – A person who looks after people when they are unwell
Session 4	**Teeth** You should brush your teeth twice a day with water, a toothbrush and toothpaste. Plaque can build up on your teeth and can damage your teeth and gums	Children may not be able to count the number of teeth they have. Ask them to work in pairs to complete this section of the enquiry. Children may find it difficult to recall their age or count the number of teeth they have. Once they have counted and recorded this information, children could stand in line from oldest to youngest to make pattern-spotting easier.	Why is it important to brush your teeth? How long should you brush your teeth for? How often should you brush your teeth? How can you keep your gums healthy? What could happen if you do not brush your teeth? How does brushing your teeth help to keep your body healthy? Who could help us if we have problems with our teeth?	teeth – The hard bone-like structure in the mouth used to bite and chew through food. plaque – A sticky coating that covers the teeth and gums if they are not brushed regularly. filling – A filling is used to treat a small hole in the tooth

Year 2 LESSON OVERVIEWS (Declarative & Procedural knowledge)

Curriculum links –
Identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses.

Working scientifically (Procedural knowledge)
Identifying and classifying.
Performing simple tests.
Use simple features to compare objects, materials and living things and, with help, decide how to sort and group them (non-statutory).
Asking simple questions and recognising that they can be answered in different ways
Observing closely, using simple equipment.

Year 2 – Materials	Declarative (sticky) Knowledge	Possible misconceptions	Key Questions	Vocabulary
Session 1	**Explore Materials** Objects can be made from different materials. Some materials are natural such as sand, wood and wool. Some are man-made such as plastic and brick. Some materials are recyclable and can be used again	Children may think that the term “material” is only used for objects inside the classroom such as toys or equipment. Allow children to identify materials outside in their local area to address this misconception. Children may think that all materials are man-made. Show examples of common natural materials such as wood, wool or sand.	What are natural materials? What are man-made materials? What does “recyclable” mean? Is a recyclable material? How can we sort and group these materials? How many ways can you think of?	material – what an object is made from natural material – a material that comes from animals, plants or the Earth man-made material – a material made by humans recycle – to change rubbish into a material that can be used again
Session 2	**Wood, Paper and Cardboard,** Paper and cardboard are made from wood. Wood, paper and cardboard come from trees. There are different strengths of wood, paper and cardboard. Wood, paper and cardboard can all be recycled and used again	Children may think that all paper has the same thickness and texture. Provide a wide range of different papers for children to test, such as tracing paper, sugar paper and cardboard. Children may think that all wooden objects are heavy.	What material is paper/cardboard made from? What two words can you use to describe wood? What two words can you use to describe paper? What two words can you use to describe cardboard? Can you change the shape of paper, cardboard or wood? How? Which material would be most suitable for a ? Why? Which material would be unsuitable for a ? Why	material – what an object is made from smooth – an even surface rough – an uneven surface flexible – can change shape easily rigid – cannot change shape easily

Session 3	**Brick & Rock** Rocks are a natural material. Bricks are a man-made material. Rocks and bricks can be used to build houses, buildings and roads	Children may think that all rocks are heavy. Children may think that all rocks are hard and cannot be broken easily. Children may think that rocks and stones are different materials. Explain to children that stone is a word used to describe smaller rocks.	What are rocks? What are bricks? Are rocks a natural or man-made material? Are bricks a natural or man-made material? Why would builders choose to build a house with bricks? Would it be more suitable to build a statue from rock or bricks? Why do you think this?	rock – a natural material found on or underneath the Earth's surface stone – a smaller rock pebble – a small, smooth rock that has been shaped by water brick – a man-made building material material – what an object is made from
Session 4	**Glass & Plastic** Glass is hard and brittle. Plastic can be flexible or hard. Some plastic can be recycled. All glass is recyclable	Children may think that glass and plastic are the same material as they have a lot of similar properties. Children may think all plastic is hard.	What words could you use to describe plastic? What words could you use to describe glass? What are the similarities between plastic and glass? What are the differences between plastic and glass? What does "transparent"/"translucent"/"opaque" mean? When would glass/plastic be a suitable material for an object? When would glass/plastic be an unsuitable material for an object?	brittle – easily broken flexible – can change shape easily transparent – materials you can see through translucent – materials that allow some light to pass through so you cannot see clearly through them opaque – materials you cannot see through
Session 5	**Metal** Metal comes in many forms and colours. Some metals are flexible and can easily change shape. Some metals cannot change shape easily. Metal can be used to make many different object	Children may think that all metals are silver. An easy way to avoid this misconception is to allow children to explore different coins. Children could identify the different coins and sort them into groups. Children may think that all metals are rigid. Aluminium foil is a familiar metal that can be used to show children that some metals can change shape easily. Children may think that all metals are heavy.	What objects can be made from metal? Are all metals rigid? Why do you think this? Are all metals silver? How many metallic objects can you find that are not silver? Why is metal a suitable material for ? Why is metal an unsuitable material for ? How can you group these metal objects? Can you group them another way	hard – not easily broken or bent flexible – can change shape easily shiny – a surface that can reflect light easily dull – not clear, bright or shiny rigid – cannot change shape easily
Session 6	**Fabrics** Fabrics can be natural. Fabrics can be man-made. Fabrics have different uses	Children may think that fabrics are not materials. They may think that natural fabrics, such as wool and cotton, are not fabrics. Create a quick quiz to recap objects/items and where the material comes from. For example, a woollen jumper is made from the wool of a sheep.	What are natural fabrics? How many natural fabrics can you name? What are man-made fabrics? How many man-made fabrics can you name? Are all fabrics soft? What fabric would be the best for a coat? What fabric would be the best for a PE kit? Which fabric would be the most suitable for ?	fabric – a material made from weaving or knitting threads together flexible – can change shape easily tough – not easily broken lightweight – fabric that is thin and light

Year 2 LESSON OVERVIEWS (Declarative & Procedural knowledge)

Curriculum links –

Working scientifically (Procedural knowledge)
Explore the world around them and raise their own questions
Using their observations and ideas to suggest answers to questions.

Year 2 – Plastic	Declarative (sticky) Knowledge	Possible misconceptions	Key Questions	Vocabulary
Session 1 **-Term 1**	Plastic can be helpful. Plastic can be harmful for humans and other animals. Some plastic can be recycled. Some plastic cannot be recycled	Children may think that throwing recyclable plastic in the refuse bin has no impact on the planet. Discuss the differences between recyclable and non-recyclable plastic to address this	How is plastic helpful? How is plastic harmful to humans? How is plastic harmful to other animals? What is “single-use” plastic? What does “recycle” mean? Why is it important to recycle? Can all plastics be recycled? How do we know if an object is recyclable or not	man-made material – a material made by humans recycle – to change rubbish into a material that can be used again single-use plastic – plastic that is used once and thrown away
Session 2 – **Term 1**	**P**lastic is helpful and harmful. There are ways to reduce your plastic waste	Children may think that their plastic waste has no impact on the planet. Children may think that once a plastic item has been used it cannot be used again. Show children a used and washed yoghurt pot. Ask them to think of ways this yoghurt pot could be used again in school.	How is plastic helpful? How is plastic harmful? What is “single-use plastic”? What does “recycle” mean? What is “plastic waste”? How can we reduce our plastic waste in school? Why is it important to reduce our plastic waste	man-made material – a material made by humans recycle – to change rubbish into a material that can be used again single-use plastic – plastic that is used once and thrown away
Session 3				
Session 4				
Session 5				

Session 6				

Year 2 LESSON OVERVIEWS (Declarative & Procedural knowledge)

Curriculum links –
Find out and describe how plants need water, light and a suitable temperature to grow and stay healthy.
Working scientifically (Procedural knowledge)
– Observing closely, using simple equipment
Asking simple questions and recognising that they can be answered in different ways.
Performing simple tests.

Year 2 – Plants	Declarative (sticky) Knowledge	Possible misconceptions	Key Questions	Vocabulary
Session 1	**Explore Plants** A plant is a living thing. There are many different types of plants. Many plants have flowers or fruit. Parts of some plants can be eaten.	Children may have preconceived ideas about what a plant is. They may not classify fruit, vegetables or herbs as plants. Show children images of these plants so they can see how these parts of a plant grow. Children may think that trees are not classified as plants	What is similar about these plants? What is different about these plants? How did you group the plants? Can you group them another way? How many ways can you think of? What are fruits? What are vegetables? How many fruits and vegetables can you name?	plant – a living thing that usually grows in soil flower – the part of a plant that blooms fruit – a part of a plant that contains seeds vegetable – a part of a plant that can be eaten as food, such as a stem, root or leaf herb – a plant that can be used to flavour food
Session 2	**Plant Parts** Trees have roots, a trunk, branches and leaves. Many trees have blossom or fruit. Flowering plants have roots, a stem, leaves and petals.	Children may need to recap the terms “deciduous” and “evergreen” from Year 1 to understand that some trees lose their leaves during autumn and winter and some keep their leaves. Children may have preconceived ideas about fruit based on the fruit they eat regularly	Where is the stem/roots/leaves/petals? Where is the trunk/branches/leaves/blossoms? What is similar/different about these plant parts? What patterns can you spot with the petals? What is similar between plants and trees? What are the differences between plants and trees? Are there any similarities between these tree parts and parts of other plants? What is different about tree parts and other plant parts?	blossom – the flowering part of a tree stem – the long and thin part of a plant which sits above the soil leaf – the flat, green part of a plant that grows from the stem or branch trunk – the main stem of a tree branch – the part of a tree that grows from the trunk
Session 3	**What do plants need to grow?** Plants need water to grow and stay healthy. Plants need light to grow and stay healthy.	Children may think that all seeds grow into the same plants. Show children some examples of different seeds and pictures of the plants they grow into.	Why do plants need water? What happens if plants do not receive enough water? How does water help plants grow? Why do plants need sunlight? What happens if plants do not receive enough sunlight?	seed – a part of a plant that can grow into a new plant plant – a living thing that usually grows in soil sunlight – the light from the Sun

	If plants do not have water and light, they may become weak and not grow properly	Children may think that the seed consumes the soil to begin it's life cycle.	How does sunlight help plants grow?	
Session 4	**Light & Dark - Plan**	Children may think that plants do not need any light at all to grow. Children may think that all plants need the same amount of light. This is not the case, as some need strong, direct sunlight while others do not	What do plants need to grow and stay healthy? How can we make sure one plant gets sunlight and the other does not? How often should we observe the plants? What things should we keep the same for both plants? What will we change? What do you think will happen to the plants? Will the plant in the light or the one in the dark grow better? Why?	independent variable (what will change) – the amount of light the plant receives dependent variable (what will be measured) – the growth of the plants, the height of the plants controlled variables (what is kept the same) – the number of seeds in a pot, the amount of water the plant receives, the amount of soil in the pots
Session 5	**Investigate – light & dark**	Children may think that plant growth will happen over a short period of time, such as overnight. Explain to them that plant growth can take days or weeks before any changes above the surface of the soil are visible. Ensure that the seeds are not overwatered as this will affect plant growth.	What do you predict will happen to the plants in the light? What do you predict will happen to the plants kept in the dark? Why is it important to water both plants? How often will you water both plants? How much water will you give to both plants?	seed – a part of a plant that can grow into a new plant plant – a living thing that usually grows in soil sunlight – the light from the Sun compost – a type of soil

Year 2 LESSON OVERVIEWS (Declarative & Procedural knowledge)

Curriculum links –
Identify that most living things live in habitats to which they are suited and describe how different habitats provide for the basic needs of different kinds of animals and plants, and how they depend on each other
Identify and name a variety of plants and animals in their habitats, including microhabitats.
Describe how animals obtain their food from plants and other animals, using the idea of a simple food chain, and identify and name different sources of food
Explore and compare the differences between things that are living, dead, and things that have never been alive
Working scientifically (Procedural knowledge)
Gathering and recording data to help in answering questions.
Using their observations and ideas to suggest answers to questions
Identifying and classifying
Observing closely, using simple equipment

Year 2 – Living Things & their Habitats	Declarative (sticky) Knowledge	Possible misconceptions	Key Questions	Vocabulary
Session 1	**Habitats in my local area** A habitat is where a plant or animal lives. A habitat provides everything a plant or animal needs to survive. All animals and plants have a habitat. There are different habitats in my local area	Children may think that it is only animals that have a habitat. Explain to children that plants also have a habitat which provides everything they need to survive.	What is a habitat? What habitats do we have in our local area? What mammals live in this habitat? What birds live in this habitat? Why is this a suitable habitat for a_____? Why is this an unsuitable habitat for a ____?	mammal – an animal with fur/hair bird – an animal with feathers, wings and a beak deciduous tree – a tree that loses it leaves during autumn evergreen tree – a tree that keeps its leaves all year round habitat – a place where an animal or plant lives
Session 2	**Polar habitats** A habitat is where a plant or animal lives. A habitat provides everything a plant or animal needs to survive. Polar animals can survive in extremely cold weather. Some polar animals are carnivores.	Children may think that animals cannot survive in the Arctic or Antarctica due to extremely cold temperatures. Children may think that plants will not grow in polar habitats.	What is a habitat? What animals live in the Arctic? What animals live in Antarctica? What habitat does a ____have? Why can a_____ survive in a polar habitat? What plants live in a polar habitat? What does a _____eat?	carnivore – an animal that eats other animals herbivore – an animal that eats plants Arctic plants – plants that grow in the Arctic habitat – a place where an animal or plant lives hibernate – to spend a long period of time in a deep sleep

	Some polar animals are herbivores			
Session 3	**Desert Habitats** A habitat is where a plant or animal lives. A habitat provides everything a plant or animal needs to survive. Desert animals can survive in extremely hot weather. Some plants can survive for a long time without water	Children may think that it is always hot in the desert. Explain that at night, the desert can be extremely cold too. Children may think that no plants and animals can survive in the desert due to the heat and lack of water.	What is a habitat? What animals live in the desert? What plants live in the desert? What habitat does a_____ have? What is the weather like in the desert? Why can a _____survive in the desert? What does a _____eat?	reptile – an animal with dry scales cactus – a plant with spines desert – an area often covered in sand with very little rainfall habitat – a place where an animal or plant lives rainfall – the amount of rain that falls in one place
Session 4	**Ocean Habitats** A habitat is where a plant or animal lives. A habitat provides everything a plant and animal needs to survive. Ocean animals include fish, mammals and reptiles. Some animals eat plants and others use plants for shelter or to hide from other animals	Children may think that all animals in the sea are fish. This step is a good opportunity to recap learning from previous blocks to identify fish and other animals that live in seas and oceans, such as mammals	What is a habitat? What animals live in the ocean? Are all animals that live in seas and oceans fish? Explain your thinking. Why is a_____ best suited to an ocean habitat? What plants survive in the ocean? How do animals use the plants in the ocean to survive?	ocean – a large area of seawater fish – an animal that lives in water which usually has fins, scales and gills mammal – an animal with fur or hair on its body seagrass – a plant that grows and lives in the water habitat – a place where an animal or plant lives
Session 5	**Woodland Habitats** Children may think that a particular animal only has one habitat. For example, a fox can be found in a woodland habitat but it can also inhabit an urban area. Children may think that it is only animals that have a habitat. Explain to children that plants also have a habitat which provides everything they need to survive.	A habitat provides everything a plant or animal needs to survive. Animals and plants live in woodland habitats. In woodlands, some animals eat plants and others use plants for shelter	What is a habitat? What animals live in a woodland habitat? What plants live in a woodland habitat? Why is a____ best suited to a woodland habitat? Why is a_____ best suited to a woodland habitat? How do animals use the plants and trees in the woodland to survive	woodland – a large area with trees, shrubs and other plants fern – a plant with long stems and feather-like leaves mammal – an animal with fur or hair on its body bird – an animal with feathers, wings and a beak moss – a plant that grows in damp conditions
Session 6	**Microhabitats** A habitat is where a plant or animal lives. microhabitat is a very small habitat. Insects, snails, worms and spiders all live and survive in microhabitats	Children may think microhabitats do not occur in other areas, e.g. in woodlands. Children may think that all animals live in the same microhabitats	What is a habitat? What is a microhabitat? What plants live in this microhabitat? What animals live in this microhabitat? What plants/animals would not live in this microhabitat? How does this microhabitat provide everything that animals/ plants need? Do all insects live in the same microhabitat?	microhabitat – a very small habitat insect – a small animal that has six legs spider – a small animal that has eight legs snail – a small animal with a soft body and a shell habitat – a place where an animal or plant lives
Session 7	**Habitats and diet** An animal's habitat provides the food it needs to survive. Some animals are carnivores. Some animals are herbivores. Some animals are omnivores	Children may confuse carnivores, herbivores and omnivores. Children may think that all carnivores/herbivores/ omnivores eat the same diet and not consider the food available in their habitats	What is a habitat? What is a carnivore? What is a herbivore? What is an omnivore? Where do most animals find their food? What food would be available in this habitat for a carnivore/ herbivore/omnivore?	carnivore – an animal that eats other animals herbivore – an animal that eats plants omnivore – an animal that eats other animals and plants habitat – a place where an animal or plant lives diet – the food eaten by an animal
Session 8	**Food chains** A food chain shows how different living things rely on each other. A food chain normally starts with plants.	Children may not realise that energy is passed within a food chain. Children may not fully understand the implications of one part of the food chain being removed.	What is a carnivore? What is a herbivore? What is an omnivore? What is a food chain?	food chain – the order in which energy is passed from one plant or animal to another when they are eaten carnivore – an animal that eats other animals

	Some animals eat other living things for energy.	Children may not draw arrows the right way round to show the passing of energy on their food chains	How does energy pass from a plant/animal to another animal? What would happen if we removed one part of the food chain?	herbivore – an animal that eats plants omnivore – an animal that eats other animals and plants diet – the food eaten by an animal
Session 9	**Living, dead or near alive?** Animals, plants and humans are living things. Living things need certain things to survive, such as water, food, shelter and air. Living things can die. When something is dead, it was once living. Some things were never alive, such as rocks, water or toys	Children may confuse things that are dead and things that were never alive. The topic of living things dying needs to be approached with extra care and sensitivity.	Is a _____living/dead or has it never been alive? What are some examples of living things? What are some examples of non-living things? Which of these things are living? Which of these things are dead? Which of these things have never been alive? What is the same about things that are dead and things that have never been alive? What is different about things that are dead and things that have never been alive	living – something that is alive dead – something that was once living but is now not alive never alive – something that has never been living plant – a living thing that sometimes grows in soil animal – a living creature

Year 2 LESSON OVERVIEWS (Declarative & Procedural knowledge)

Curriculum links –
Working scientifically (Procedural knowledge)

Year 2 – Plants	Declarative (sticky) Knowledge	Possible misconceptions	Key Questions	Vocabulary
Session 1	**Bulb or seed?**			
Session 2	**What do plants need ot grow?**			
Session 3	**Plants – bulbs & seeds**			
Session 4	**Plants – bulbs & seeds**			

Year 2 LESSON OVERVIEWS (Declarative & Procedural knowledge)

Curriculum links –
Working scientifically (Procedural knowledge)

Year 2 – Growing Up	Declarative (sticky) Knowledge	Possible misconceptions	Key Questions	Vocabulary
Session 1				
Session 2				

Session 3				
Session 4				
Session 5				
Session 6				

Year 2 LESSON OVERVIEWS (Declarative & Procedural knowledge)

Curriculum links – **Working scientifically (Procedural knowledge)**				
Year 2 – Bulbs and seeds	**Declarative (sticky) Knowledge**	**Possible misconceptions**	**Key Questions**	**Vocabulary**
Session 1				
Session 2				
Session 3				
Session 4				
Session 5				
Session 6				

Year 3 LESSON OVERVIEWS (Declarative & Procedural knowledge)

Curriculum links –
Identify that humans and some other animals have skeletons and muscles for support, protection and movement.
Working scientifically (Procedural knowledge)

- Asking relevant questions and using different types of scientific enquiries to answer them.
- Recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables.
- Talk about criteria for grouping, sorting and classifying (non-statutory).
- Reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions.

Year 3 – Skeleton	Declarative (sticky) Knowledge	Possible misconceptions	Key Questions	Vocabulary
Session 1	**Name and identify bones in the human body** Humans have skeletons which are made up of lots of different bones. An adult human typically has 206 bones that make up the skeleton. The skull, spine (backbone), ribcage, pelvis and femur are bones within the skeleton.	Children may think that the skeleton is one large bone, rather than a collection of bones. They may believe that bones in the body do not have specific names, for example, they may think all bones in the leg are called “leg bones”. Children may think that the arms and legs are one long bone, rather than made up of multiple bones.	How many bones are there in the human skeleton? Where is the skull found in the skeleton? Where is the femur found? Where is the pelvis found in the skeleton? Where is the ribcage found? Where is the spine found in the skeleton?	ribcage, skull, pelvis, spine, femur

Session 2	**Functions of the skeleton** Bones have specific functions. The skull protects the brain. The femur helps humans to stand and move. The pelvis helps to support the spine. The spine helps humans to twist and be held upright. The ribcage protects the heart and lungs.	Children may think that bones within the skeleton do not have a function. They may believe that all bones must protect an internal organ, such as the skull or the ribcage. Children may think that all bones have the same function.	What are the functions of the skeleton? Why is the skeleton important? What is the function of the skull, or femur, or ribcage? What would happen if humans did not have a spine? What is similar about the skull and ribcage? What is different?	**ribcage** – Curved bones in the chest that protect the heart and lungs. **skull** – The bones in the head that protect the brain. **spine** – A group of small bones stacked on top of each other in the back that support movement. **pelvis** – A rounded "bowl-like" set of bones which connect the spine to the legs. **femur** – A long bone in the upper leg that supports movement.
Session 3	**Name and identify bones in a range of animals** Mammals, birds, fish, amphibians and reptiles have skeletons. There are some similarities and differences in skeletons of different animals. Animal skeletons are made up of lots of different bones.	Children may think that humans are not mammals and that other mammals have a different skeletal system to humans. They may think that all animals have a skull, spine, femur, pelvis and ribcage. Show examples of a wide range of animals to challenge this misconception.	What bones can you identify in these amphibians, or reptile, or fish, or bird skeletons? What are the similarities between mammal and bird skeletons? What are the differences? How are human skeletons similar to other mammals? Are there any differences? Do each of these animals have a spine/femur/pelvis/ribcage? Where is it on the skeleton	**mammal** – A warm-blooded animal with a spine and hair or fur. **bird** – An animal with a spine, feathers, wings and a beak. **fish** – Animals that live in water with fins, gills and scales. **amphibian** – A cold-blooded animal with a spine that lives on land and in water. **reptile** – A cold-blooded animal with a spine and dry scales.
Session 4	**Animals with and without a spine** Some animals have a spine. Some animals do not have a spine. Some animals have an exoskeleton. An exoskeleton provides support and protection.	Children may think that if an animal does not have a spine, then it cannot move. Children may believe that animals without a spine have no form of skeleton. Children may think that all spineless animals have an exoskeleton. They should be shown a range of animals without a spine or exoskeleton to address this misconception, e.g. a slug.	Name 3 animals that have a spine. Name 3 animals that do not have a spine. What is an exoskeleton? What is its function? Name 2 animals with an exoskeleton. How can we sort these spineless animals into groups? How many ways can you group them	**spine** – A group of small bones stacked on top of each other in the back, also known as the "backbone". **antennae** – The organ on an insect's head that it uses to touch and smell. **insect** – A small animal that has three body sections, six legs and antennae. **exoskeleton** – A form of skeleton on the outside of an animal's body that provides support and protection.
Session 5	**Are all skeletons the same?** Animals have different skeletons. All mammals, birds, fish, reptiles and amphibians have a spine. Some animals do not have spines. Skeletons provide support, protection and allow movement.	Children may think that all skeletons are the same and have the same bone structure. When looking at specific groups, children may think that all animals within that group have the same skeletal structure. For example, snakes and lizards have very different skeletons but are both classified as reptiles. Another example of this could be humans and whales.	Name 3 animals with a spine. Name 3 animals without a spine. What is an exoskeleton? What are the differences between the skeletons of a bird and a snail? How can you sort and group these animals? How many ways can you think of	**skeleton** – A collection of bones that provide protection and support movement. This appears different in different animals. **exoskeleton** – A form of skeleton on the outside of an animal's body that provides support and protection.

Curriculum links
Identify that humans and some other animals have skeletons and muscles for support, protection and movement.

Working scientifically (Procedural knowledge)
Recognise when and how secondary sources might help them to answer questions that cannot be answered through practical investigations (non-statutory)
Communicate their findings in ways that are appropriate for different audiences (non-statutory)

Year 3 – Movement	Declarative (sticky) Knowledge	Possible misconceptions	Key Questions	Vocabulary
Session 1	**Joints** A joint is where two or more bones meet. There are different joints in the human body. The knees and elbows are hinge joints. The shoulders and hips are ball and socket joints	Children may think that all joints allow movement in the same way. Images or simple models of each joint type would help children to spot differences between the movement patterns.	What is a joint? • Why do we have joints? • Where are your knee, hip, shoulder and elbow joints? • What movement does a ball and socket joint allow? • What movement does a hinge joint allow? • Do all joints allow the same movement? • Are humans the only animals with joints? Explain your thinking. • What would happen if a skeleton did not have joints?	joints – A point where two or more bones meet. hinge joint – A joint that only allows bending and straightening. ball and socket joint – A joint with a round head of bone that fits inside the cup of another bone to allow movement in all directions. skeleton – A framework of bones
Session 2	**How We Move** Muscles are attached to bones. Muscles can only pull on bones and cannot push. Muscles work in pairs by contracting and relaxing. Bones, muscles and joints work together to allow movement.	Children may think that muscles work independently. Explain that muscles work in pairs to allow movement. Demonstrate this idea by asking children to contract their biceps. The biceps contract as the triceps relax.	What are the names of three bones in the human body? What are the names of two joint types in the human body? Where are your biceps? Where are your triceps? What joints are your biceps and triceps attached to? What does “contract” mean? What does “relax” mean? How do muscles work in pairs to allow movement? What would happen if humans had no muscles/joints/skeleton	joint – A point where two or more bones meet. Muscle – Works with joints and bones to allow movement. Muscle Joint bicep and tricep – Muscles in the upper arm. contracting – A tightening and shortening motion. relaxing – A relaxing and lengthening motion.

Year 3 LESSON OVERVIEWS (Declarative & Procedural knowledge)

Curriculum links –
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.
Working scientifically (Procedural knowledge)
Using straightforward scientific evidence to answer questions or to support their findings
Reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions.
Identifying differences, similarities or changes related to simple scientific ideas and processes.

Year 3 – Nutrition & Diet	Declarative (sticky) Knowledge	Possible misconceptions	Key Questions	Vocabulary
Session 1	**Food Groups** Humans need the right types and amount of food. Humans get their nutrition from what they eat. Food can be sorted into five food groups – fruit and vegetables, carbohydrates,	Children may think that all food has the same nutritional benefits for the body. Children may think that drinks have no impact on a healthy/balanced diet. Children may use their personal preferences to sort food based on whether it should be eaten regularly, sometimes or occasionally.	What are the names of the five food groups? What is a fruit/vegetable? Which foods contain carbohydrates/protein/dairy? What food should you eat regularly/sometimes/occasionally? How can we sort and group these foods? How many ways can you think of?	carbohydrate – food such as bread, cereals, pasta and rice protein – food such as eggs, beans, fish and meat dairy product – food made from the milk of an animal fat – food such as avocados, oil, butter, fried food and nuts sugar – a substance used to make food and drinks sweet

	protein, dairy and alternatives and fats and sugars			
Session 2	**Understand the Five Food Groups** Fruit and vegetables provide the body with essential vitamins. Carbohydrates provide the body with energy. Protein helps with muscle growth and repair. Dairy products contain calcium, which is good for teeth and bones. Fats can be grouped into healthy and unhealthy fats	Children may believe that all foods that are classified as proteins are meat products. Children may think that adults who follow a vegan or vegetarian diet cannot get any protein within their die	What do fruits and vegetables provide the body with? What do carbohydrates and fats provide the body with? What do proteins help the body to do? What do dairy products do for the body? What could happen if you did not eat enough fruit and vegetables? What could happen if you ate too many foods which are high in fat or sugar	fruit and vegetables – provide the body with vitamins and minerals carbohydrates – provide the body with energy protein – helps the body to build and repair muscles dairy – can help young children to form healthy bones and teeth fats – healthy fats provide energy whilst unhealthy fats can cause weight gain if eaten too often
Session 3	**Balanced Diets** Humans need to eat a healthy, balanced diet to maintain good health. Humans should eat a wide variety of foods and consume the right amount to maintain a healthy body weight. The Eatwell Guide shows how much of each food group we should eat to achieve a healthy and balanced diet	Children may believe that all food groups need to be eaten in equal amounts and may design a meal that is not nutritionally balanced. Children may incorrectly classify food in their meal. For example, they may state that potatoes are their source of vegetables, rather than a source of carbohydrates	What is a balanced diet? What is a balanced meal? Why is it important to eat balanced meals? What food should you eat often? Why should you eat these foods often? What food should you only eat occasionally? Why should you only eat these foods occasionally	balanced diet – a diet that fulfills a person's nutritional needs balanced meal – a meal that has a wide variety of food in the correct proportions nutrition – taking in and using food to keep the body healthy eat well Guide – a guide that shows how much we should eat approximately from each food group
Session 4	**Compare diets** All humans need a balanced diet including food from all five food groups. There are a variety of human diets including vegan, vegetarian, pescatarian and omnivorous diets. People who eat a vegan diet get protein from sources that are not animal products.	Children may think that all humans have the same dietary requirements. Children may think that there are no similarities between a vegan, vegetarian, pescatarian and omnivorous diet. Children may think that people who follow a vegetarian or vegan diet are unable to get protein-rich food.	What do people who follow a vegan diet eat/not eat? What do people who follow a vegetarian diet eat/not eat? How do vegetarians and vegans get protein in their diets? How are vegan and vegetarian diets similar? How are vegan and vegetarian diets different? What do people who follow a pescatarian diet eat? How is a pescatarian diet similar/different to a vegan or vegetarian diet?	vegan diet – a diet that does not include meat or animal products vegetarian diet – a diet that does not include meat but does include animal products such as cheese or eggs pescatarian diet – a diet that includes fish but no other meat products omnivorous diet – a diet that includes all food types
Session 5	**Animal Diets** Animals need the right type and amount of nutrition. They cannot make their own food, instead they get their nutrition from what they eat. Some animals are carnivores – they eat other animals. Some animals are herbivores – they only eat plants.	Children may incorrectly group carnivores, herbivores and omnivores with their dietary needs. Children may believe that animals that are kept as pets and those in the wild have the same dietary needs. Highlight to children that their dietary needs may differ depending on whether they hunt for food or not.	What is a carnivore/herbivore/omnivore? Is a _____ a carnivore, a herbivore or an omnivore? Why do animals have different diets? Why is the diet of a wild animal different to that of a pet? What do you notice about a carnivore's teeth? Why do you think carnivores have sharp teeth? What do you notice about an omnivore's teeth? Why do you think omnivores have large, flat teeth	diet – the food a living thing needs herbivore – an animal that eats plants carnivore – an animal that eats other animals omnivore – an animal that eats other animals and plants

Year 3 LESSON OVERVIEWS (Declarative & Procedural knowledge)

Curriculum links –

Working scientifically (Procedural knowledge)
Asking relevant questions and using different types of scientific enquiries to answer them
– Reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions

Year 3 – Food Waste	Declarative (sticky) Knowledge	Possible misconceptions	Key Questions	Vocabulary
Session 1	**What is food waste?** Food waste is food that is safe to eat but is thrown away instead. Some food can be turned into compost. A lot of food waste ends up in landfill sites, where it rots and has negative impacts on the planet	Children may think that food waste has no impact on the planet. Children may think that "putting food in the bin" is the correct way to dispose of edible food. Children may not realise that food that is put in the bin ends up in landfill sites, which are harmful for planet Earth	Where does the food we eat come from? What is food waste? What happens to food once it is thrown away? Why does it matter if food is thrown away? What are the problems with food waste? How can food waste be reduced? How does food waste affect the environment?	food waste – food that is safe to eat but is thrown away instead landfill – an area or site where waste materials are disposed of. The waste is often buried underneath the ground food label – information shown on food packaging compost – a material used to help plants grow

Session 2	**How can we reduce our food waste?** Food waste is food that is safe to eat but is thrown away instead. There are different ways that food waste can be reduced	Children may think that reducing their own food waste will have no impact globally. Children may think that "putting food in the bin" is the correct way to dispose of edible food.	What is food waste? What happens to food once it is thrown away? Why does it matter if food is thrown away? What are the problems with food waste? How can we reduce our food waste in school? Why is it important to reduce our food waste in school? How can we reduce our food waste at home? Why is it important to reduce our food waste at home	food waste – food that is safe to eat but is thrown away instead landfill – an area or site where waste materials are disposed of. The waste is often buried underneath the ground food label – information shown on food packaging compost – a material used to help plants grow

Year 3 LESSON OVERVIEWS (Declarative & Procedural knowledge)

Curriculum links –
Compare and group together different kinds of rocks on the basis of their appearance and simple physical properties.

Working scientifically (Procedural knowledge)
– Talk about criteria for grouping, sorting and classifying (non-statutory)
Making systematic and careful observations
– Gathering, recording, classifying and presenting data in a variety of ways to help in answering questions

Year 3 – Rocks	Declarative (sticky) Knowledge	Possible misconceptions	Key Questions	Vocabulary
Session 1	**Identify Rocks** Some rocks have grains. Some rocks have crystals. Some rocks have layers. Some rocks are light and some are heavy.	Children may think that all rocks are heavy. Children may think that all rocks are hard.	What is a rock? What rock is this? What do you notice about ? Are there any similarities between these two rocks? Are there any differences? Which rocks have crystals	granite – a hard rock with crystals pumice – a light rock with small holes sandstone – a light-coloured rock with grains chalk – a soft white rock

Session 2	**Group Rocks** Rocks can be sorted in different ways. Some rocks have grains. Some rocks have crystals. Some rocks have layers. Some rocks are light and some are heavy	Children may think that all rocks are the same. Allow children to use hand lenses to observe crystals, grains and layers closely.	What do you notice about ? Are there any similarities between these two rocks? Are there any differences? Which rocks have crystals? Which rocks have grains? Which rocks have layers? How can you group these rocks? How many ways can you think of	marble – a hard white rock gneiss – a hard rock with layers
Session 3	**Test Rocks** Some rocks are hard. Some rocks react with acid. Some rocks are brittle. Some rocks float and some sink	Children may think that all rocks are hard and cannot break easily. Children may think that all rocks are heavy and therefore will sink	What do you notice about these rocks? Are they all the same? What is different? Which rock is the hardest? Will these rocks float or sink? • Will any of these rocks react with acid (vinegar)?	reaction – a change, which can be seen with a temperature change, bubbles or a colour change hardness – a measure of a rock's resistance to scratching float – to sit on top of water sink – to fall below the surface of water brittle – easily broke
Session 4	**Local rock study** Rocks are used as building materials. Rocks have different textures and appearances. Some rocks change over time	Children may think only large buildings are made from rocks. However, gravestones, cobbles, walls, tiles and stairs are also examples of structures made from different rock types.	What buildings are made from rock in our local area? Is the building made from newer or older rock? How do you know? Does the rock have crystals, grains or layers? How has this rock changed over time? Why has it changed?	texture – what something looks and feels like weathering – the breaking down of rocks over time

Year 3 LESSON OVERVIEWS (Declarative & Procedural knowledge)

Curriculum links
Describe in simple terms how fossils are formed when things that have lived are trapped within rock

Working scientifically (Procedural knowledge)
Asking relevant questions and using different types of scientific enquiries to answer them
Reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions

Year 3 – Fossils	Declarative (sticky) Knowledge	Possible misconceptions	Key Questions	Vocabulary
Session 1	**Looking at Fossils** A fossil is the remains or trace of a living thing that lived a long time ago. Both animals and plants can become fossils.	Children may think that only the remains of animals can become fossils. Children may think that a fossil can be formed in a short period of time. Explain that it takes thousands of years for a fossil to form	What is a fossil? What could this animal have looked like? What could this plant have looked like? Which parts of an animal usually turn into a fossil? How long does it take for a fossil to form? Why are fossils useful for scientists?	fossil – the remains or trace of a living thing that lived a long time ago rock – a natural material found on or underneath the Earth's crust skeleton – a collection of bones

	Older fossils are found deeper underground. Fossils are usually formed from the shells or bones of living things. Animal footprints and tracks can also form fossils			shell – a hard covering on the outside of an animal's body
Session 2	**Fossil Formation** Fossilisation is the process that explains how a fossil is formed. Fossilisation is a rare process that only occurs under certain conditions. When an animal dies, the soft parts of its body break down, leaving behind the hard parts such as the skeleton. The process of fossilisation takes thousands of years	Children may think that fossilisation always occurs when an animal or plant dies. Explain that it is a very rare process that only happens under certain conditions	What is fossilisation? What is sediment? What are the key stages of fossilisation? What conditions are needed for fossilisation to occur? How has this animal turned into a fossil? How long does fossilisation take?	fossilisation – the process through which a fossil is formed rock – a natural material found on or underneath the Earth's crust skeleton – a collection of bones fossil – the remains or trace of a living thing that lived a long time ago sediment – small pieces of soil, sand, gravel and small rocks

Year 3 LESSON OVERVIEWS (Declarative & Procedural knowledge)

Curriculum links
Recognise that soils are made from rocks and organic matter

Working scientifically (Procedural knowledge)
Recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts and tables
Using straightforward scientific evidence to answer questions or to support their findings
Setting up simple practical enquiries, comparative and fair tests
Using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions

Year 3 -Soils	Declarative (sticky) Knowledge	Possible misconceptions	Key Questions	Vocabulary
Session 1	**Explore soil** Organic matter is the remains of dead plants and animals.	Children may think soil is just "mud" or "dirt". Clarify to them that soil is a complex mixture of small rocks, organic matter (remains of dead animals and plants) and water.	What is soil? What are the different types of soil? What is soil made up of? What are the features of chalky soil? What are the features of sandy soil?	soil – a mixture of small rocks, organic matter and water sandy soil – a soil made up of lots of sand and some clay

	Soils are made from rocks, organic matter and water. There are different types of soil including sandy, chalk, clay and peat soil. These soils have different properties	Children may think that animals cannot live in soil. Discuss animals that do live in soil, such as worms	What are the features of clay soil? What are the features of peat soil? What are the differences between these types of soil?	clay soil – a soil containing lots of clay which becomes sticky when wet peat soil – a soil that contains lots of water and organic matter chalky soil – a soil that contains lots of chalk or limestone organic matter – the remains of dead animals and plants
Session 2	**The importance of soil** Many living things need soil to survive. Soils can act as a habitat for many small animals. Soils provide nutrients for plants. Soils can also prevent flooding, as they absorb water	Children may think that only plants benefit from soil and animals do not. Highlight to them that many animals depend on soil and that it provides habitats for animals, such as worms and insects. Children may think that the loss of soil from human activity only has an impact on animals and plants. Clarify to them that soil absorbs lots of water and if soil loss occurs due to human activity, then flooding may increase, which can impact humans	Why do plants need soil? What does soil provide plants with? Why do animals need soil? What does soil provide animals with? What impact has human activity had on soil? How does this impact animals, plants and humans?	soil – a mixture of small rocks, organic matter and water nutrients – substances found in soil which help plants grow habitat loss – the decrease in resources, such as space, for a living thing to survive deforestation – the removal of large areas of trees or plants by humans habitat – an area where animals and plants live
Session 3	**Plan- soil experiment**	Children may confuse the variables in this experiment. Highlight and make clear to them what will be changed, measured and kept the same. Children may struggle to measure the amount of water that enters the measuring cylinder after it has passed through the soil and may need further support with this skill	What will you use to measure the amount of soil? What will you use to measure the volume of water? What types of soil are you using in this experiment? What will you change in this experiment? What will you measure in this experiment? What will you keep the same? How will you record your results?	independent variable (what will change) – the type of soil, such as sandy, clay, chalky and peat soil dependent variable (what will be measured) – the volume of water entering the measuring cylinder controlled variable (what is kept the same) – the mass of the soil used in the experiment, the type of filter paper, the amount of water added to each soil sample
Session 4	**Investigate – soil experiment**	Children may struggle to correctly fold the filter paper and place it in the filter funnel. You may need to demonstrate this skill prior to the investigation. Children may need support with measuring the mass of soil and the volume of water. These skills may need modelling to children before they complete their experiment	What is your experiment plan? What are you changing? What are you measuring? What are you keeping the same? What was the volume of water in the measuring cylinder? What was the mass of the soil	soil – a mixture of small rocks, organic matter and water filter paper – a piece of equipment that is used to separate materials filter funnel – a piece of equipment that allows liquids such as water to enter the measuring cylinder measuring cylinder – a piece of equipment that allows measurement of liquids
Session 5	**Evaluate – soil experiment**	Children may struggle to think of ways to improve their experiment and may state that by working with another group, their results would improve. Highlight to them that they must think of scientific ways to improve their experiment.	Which soil absorbed the most water? Which soil absorbed the least water? What is an experiment evaluation? If you were to repeat this experiment, how could you improve your results?	soil – a mixture of small rocks, organic matter and water absorb – to take in water

			What questions do you have for further investigation?	conclusion – what has been found out during an investigation based on measurement and observation evaluation – to consider the quality of the results and suggest improvements to the investigation data – information collected, such as facts, observations or numbers

Year 3 LESSON OVERVIEWS (Declarative & Procedural knowledge)

Curriculum links – **Working scientifically (Procedural knowledge)**

Year 3 – Light	**Declarative (sticky) Knowledge**	**Possible misconceptions**	**Key Questions**	**Vocabulary**
Session 1	**Light Sources**			
Session 2	**The Sun**			
Session 3	**How we See**			

Session 4	**Shadows**			
Session 5	**Opaque or Transparent?**			
Session 6	**Plan – shadow experiment**			

Year 3 LESSON OVERVIEWS (Declarative & Procedural knowledge)

Curriculum links –

Working scientifically (Procedural knowledge)

Year 3 – Plants A	**Declarative (sticky) Knowledge**	**Possible misconceptions**	**Key Questions**	**Vocabulary**
Session 1	**Parts of a plant and their functions**			
Session 2	**Plant dissection**			
Session 3	**Plan – growing experiment**			

Session 4	**Plant – growing experiment**			
Session 5	**The stem and water transportation**			
Session 6	**Looking at seeds**			
Session 7	**Reproductive parts in plants**			
Session 8	**Pollination**			
Session 9	**Seed dispersal**			
Session 10	**Life cycle of plants**			

Year 3 LESSON OVERVIEWS (Declarative & Procedural knowledge)

Curriculum links –

Working scientifically (Procedural knowledge)

Year 3 - Forces	**Declarative (sticky) Knowledge**	**Possible misconceptions**	**Key Questions**	**Vocabulary**
Session 1	**Explore forces**			
Session 2	**Friction**			
Session 3	**Plan – friction experiment**			

Session 4	**Investigate – friction experiment**			

Year 3 LESSON OVERVIEWS (Declarative & Procedural knowledge)

Curriculum links –

Working scientifically (Procedural knowledge)

Year 3 - Magnets	**Declarative (sticky) Knowledge**	**Possible misconceptions**	**Key Questions**	**Vocabulary**
Session 1	**Magnets**			
Session 2	**Magnetic and non-magnetic materials**			
Session 3	**Investigate metals**			
Session 4	**North and South Piles – attract and repel**			

Year 3 LESSON OVERVIEWS (Declarative & Procedural knowledge)

Curriculum links –

Working scientifically (Procedural knowledge)

Year 3 – Plants B	**Declarative (sticky) Knowledge**	**Possible misconceptions**	**Key Questions**	**Vocabulary**
Session 1	**Plant growth**			
Session 2	**How does space affect plant growth?**			

Year 3 LESSON OVERVIEWS (Declarative & Procedural knowledge)

Curriculum links –

Working scientifically (Procedural knowledge)

Year 3 – Biodiversity	**Declarative (sticky) Knowledge**	**Possible misconceptions**	**Key Questions**	**Vocabulary**
Session 1	**What is brio diversity?**			
Session 2	**How can we increase bio diversity in our area?**			

Year 4 LESSON OVERVIEWS (Declarative & Procedural knowledge)

Curriculum links –
Recognise that living things can be grouped in a variety of ways.
Working scientifically (Procedural knowledge)
Talk about criteria for grouping, sorting and classifying (non-statutory).
Asking relevant questions and using different types of scientific enquiries to answer them.
Gathering, recording, classifying and presenting data in a variety of ways to help in answering questions.
Reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions.

Year 4 – Group and Classify things	Declarative (sticky) Knowledge	Possible misconceptions	Key Questions	Vocabulary

Session 1	**Group Animals**	Children may incorrectly classify animals. For example, they may classify a whale as a fish because it lives in water. Discuss examples of animals that are harder to categorise before children carry out grouping and sorting activities.	Is a _____ a mammal? How do you know? What features do birds have? What features do fish have? What features do reptiles have? What features do amphibians have? Is a whale a fish? Why/why not? How are amphibians and reptiles similar? How are they different? Which animals are harder to categorise?	**vertebrate** – An animal with a spine. **mammal** – An animal with a spine, fur or hair on its body, and feeds its young on milk. **bird** – An animal with a spine, feathers, wings and a beak. **fish** – Animals that live in water and have fins and gills. Most fish have scales. **amphibian** – An animal with a spine that lives on land and in water. **reptile** – An animal with a spine and dry scales on its body.
Session 2	**Vertebrates and invertebrates** Animals with a spine are called vertebrates. Animals without a spine are called invertebrates. Insects have three body sections, six legs and antennae. Spiders have two body sections and eight legs. Slugs and snails are soft bodied invertebrates.	Children may incorrectly classify worms and spiders as insects. They are classified in a different category of invertebrate. They may think that all invertebrates have an exoskeleton. Children may think all invertebrates move in the same way.	What is a vertebrate? What is an invertebrate? What is an exoskeleton? What features do insects have? What features do spiders have? How can invertebrates be grouped? How many ways can you find to group these invertebrates?	**vertebrate** – An animal with a spine. **invertebrate** – An animal without a spine. **insect** – An invertebrate that has three body parts, six legs and antennae. **spider** – An invertebrate that has two body sections and eight legs. **soft-bodied invertebrate** – An invertebrate with a soft body such as a slug or a snail.
Session 3	**Classification keys (animals)** Classification keys are used to classify animals accurately. Closed questions are used in classification keys.	Children may use questions that are based on opinion rather than factual knowledge when trying to classify. They may create questions that are too broad and therefore do not help to classify. Model writing a broad question and also a specific question. Allow the children to discuss which example is more useful and why.	What is a vertebrate? What is an invertebrate? What features do mammals, birds, fish, amphibians or reptiles have? What features do insects, spiders or snails have? What is a classification key? Why would scientists use a classification key?	
Session 4	**Group plants** Non-flowering plants include mosses and ferns. Flowering plants can produce flowers and fruit. Deciduous trees lose their leaves annually. Evergreen trees keep their leaves all year round.	In Year 3, children used the term “stamen” to describe the male reproductive parts in plants, and “carpel” to describe the female. They do not need to use the terms “anther”, “filament”, “ovule”, “ovary”, “stigma” and “style” until Year 5.	What is a flowering/non-flowering plant? What is the difference between deciduous and evergreen trees? What are the female or male reproductive parts in plants called? How can we sort and group these plants? How many ways can you find? Look at the leaves. How are they similar? How are they different	**flowering plant** – A plant that can produce flowers and fruit. **non-flowering plant** – A plant that does not produce flowers and fruit. **stamen** – The male parts in flowering plants. **carpel** – The female parts in flowering plant

Session 5	**Classification keys (plants)** Classification keys are used to classify plants accurately. Closed questions are used in classification keys.	Children may think that plants are not living things. They may create classification questions that are based on opinion rather than factual knowledge. Children may create questions that are too broad and therefore do not help to classify. Model writing a broad question and also a specific question. Allow the children to discuss which example is more useful and why.	What is a flowering plant? What is a non-flowering plant? What characteristics do ferns and mosses have? What characteristics do flowering plants have? Do all plants have petals? Explain your thinking. Do all plants have roots? Explain your thinking. How can these plants be classified	**flowering plant** – A plant that can produce flowers and fruit. **pollination** – The process of transferring pollen from the male to the female parts of the plant to reproduce **non-flowering plant** – A plant that does not produce flowers or fruit. **fern** – A non-flowering plant with long stems and feather-like leaves. **moss** – A non-flowering plant that grows in damp, moist conditions.

Year 4 LESSON OVERVIEWS (Declarative & Procedural knowledge)

Curriculum links –
Explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment

Working scientifically (Procedural knowledge)
Gathering, recording, classifying and presenting data in a variety of ways to help in answering questions
Recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts and tables

Year 4 – Data collection A	Declarative (sticky) Knowledge	Possible misconceptions	Key Questions	Vocabulary
Session 1 – Term 1	**Data Collection A** Deciduous trees lose their leaves annually. Evergreen trees keep their leaves all year round. Vertebrates are animals with a spine. Invertebrates are animals without a spine	Children may struggle to identify unfamiliar plants in their local area. They could use knowledge from Block 1 or free apps that scan and identify plants and animals. Children may need to be reminded that invertebrates are animals and should be included in their data collection. Children may need to recap maths skills such as using tally marks accurately to record data.	How will you record the data? What plants and animals are there in our local area? How many vertebrates and invertebrates did you identify? How many flowering plants did you identify? How many non-flowering plants did you identify	vertebrate – An animal with a spine. invertebrate – An animal without a spine. flowering plant – A plant that produces flowers and fruit. non-flowering plant – A plant that does not produce flowers and fruit.
Session 2 – Term 1	**Analyse Data** Bar charts and pictograms are used to present data. Presenting data in bar charts or pictograms helps to spot patterns or trends easily. Data can be used to make conclusions and predictions for further investigations	Children may need support with maths skills such as drawing pictograms and bar graphs. They may need this modelling before completing their own examples. If children need further support with recording data, they could create a physical representation of a block diagram using cubes.	What vertebrates/invertebrates did you identify? What flowering/non-flowering plants did you identify? What was the most/least common animal? What was the most/least common plant? What patterns can you spot in your data? Do you predict your data will be similar or different in spring? Why	vertebrate – An animal with a spine. invertebrate – An animal without a spine. bar chart – A graphical display of data using bars. pictogram – A chart that uses pictures to represent data. data – Information collected, such as facts, observations or numbers.
Session 3 – Term 3	**Data Collection B** In spring, plants start to grow due to the increase in temperature and the amount of sunlight received throughout the day. In spring, animals that have hibernated come out of hibernation. There are increased numbers of active insects and other invertebrates in the spring	Children may struggle to identify unfamiliar plants in their local area. Recapping learning from Autumn Block 1 or using free apps that scan and identify plants and animals could be helpful. Children may need to be reminded that invertebrates are animals and should be included in their data collection.	How will you record the data? What plants and animals are there in our local area? How many vertebrates and invertebrates did you identify? How many flowering plants did you identify? How many non-flowering plants did you identify	vertebrate – an animal with a spine invertebrate – an animal without a spine flowering plant – a plant that produces flowers and fruit non-flowering plant – a plant that does not produce flowers and fruit
Session 4 – Term 3	**Data collection B** Bar charts and pictograms are used to present data. Presenting data in bar charts or pictograms helps to spot patterns or trends easily. Data can be used to make conclusions, comparisons and predictions for further investigations	Children may need support with drawing pictograms, block diagrams or bar charts. They could create physical representations of a block diagram using cubes	What vertebrates/invertebrates did you identify? What flowering/non-flowering plants did you identify? What was the most/least common animal/plant? What patterns can you spot in your data? How are your findings similar to or different from autumn? Why? Do you predict your data will be similar or different in summer? Why?	bar chart – a graphical display of data using bars pictogram – a chart that uses pictures to represent data data – information collected, such as facts, observations or numbers vertebrate – an animal with a spine invertebrate – an animal without a spine

Curriculum links –
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).

Working scientifically (Procedural knowledge)
Talk about criteria for grouping, sorting and classifying (non-statutory).
Identifying differences, similarities or changes related to simple scientific ideas
Asking relevant questions and using different types of scientific enquiries to answer them
Making systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers.
Gathering, recording, classifying and presenting data in a variety of ways to help in answering questions
Using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions.

Year 4 – States of Matter	Declarative (sticky) Knowledge	Possible misconceptions	Key Questions	Vocabulary
Session 1	**Explore solids, liquids and gases** Solids have a defined shape and volume. A solid material will keep its shape if it is transferred from one container to another. Liquids have no fixed shape and will take on the shape of the container they are transferred into. The volume will remain the same. Gases have no fixed shape and no fixed volume. They will spread out and fill any available space	Children may think that solid materials cannot change shape. Some solid materials can be squashed, bent, twisted or stretched. Children may think that the volume of a liquid changes when it is poured into different containers. Children may think that all solid materials are heavy.	What is this object? What material is it made from? What are the properties of solids, liquids and gases? Why is water described as a liquid? Why is a table described as a solid? Is this a solid, a liquid or a gas? How do you know? What are the similarities and differences between these materials? How can we group these materials? How many ways can you think of	solid – a material or object with a defined shape and a fixed volume liquid – a state of matter with no fixed shape but a fixed volume gas – a state of matter with no fixed shape and no fixed volume volume – the amount of space a solid, liquid or a gas takes up states of matter – these are solids, liquids and gases. Materials can be grouped into these three states of matter
Session 2	**Think differently – solids, liquids and gases** Some solids, such as sand, salt, flour and rice, can be poured but they are still classified as solid materials. Liquids maintain the same volume if transferred to different containers. Some liquids, like water, flow easily while other liquids, like treacle, do not flow as easily	Children may think that it is only liquids that can be poured. Some solids, such as sand, sugar and rice, are solid materials that can be poured. Children may think that when a liquid is poured and it flows slower than water, it is not a liquid. Oil and syrup are liquids that both flow slower than water	What is a pouring solid? What materials are pouring solids? How are oil and honey similar/different to water? If you pour sand, how is it different to pouring water? Why? Is toothpaste a solid, liquid or a gas? How do you know? Which materials are more difficult to categorise as solids, liquids or gases? Why are these materials difficult to categorise as either solids or liquids?	pouring solid – a solid that can be poured like a liquid volume – the amount of space a solid, liquid or gas takes up oobleck – a material made from corn starch and water flow – to move easily in one direction
Session 3	**Change states** Some materials can change states between solids, liquids and gases. Water can be a solid (ice), liquid (water) or a gas (water vapour). When heat is applied to ice, it melts and turns to water. When water is heated it turns into a gas. Water has a boiling point of 100°C. To change water vapour (gas) back to water (liquid) it needs to be cooled down as it returns to its liquid state. To change water to ice, it needs to be frozen. Water freezes at 0°C	Children may confuse boiling and evaporation. They may think that evaporation can only occur when water boils at 100°C. Children may think that once a material has melted it cannot turn back to a solid. Demonstrate that this process is reversible by melting and freezing an ice cube or a piece of chocolate.	What materials can melt? How can the melting process be sped up? How can a material change state from a solid to a liquid? How can a material change state from a liquid to a gas? How can a material change state from a liquid to a solid? How can a material change state from a gas to a liquid? What is “condensation”? What is “evaporation”?	freezing – the state change when a liquid turns to a solid melting – the state change when a solid turns to a liquid boiling – the state change when a liquid turns to a gas as it is heated. Boiling produces visible bubbles condensation – the state change where gas turns to a liquid evaporation – the state change when a liquid turns to a gas

Session 4	**Use equipment** A thermometer is a piece of equipment that is used to measure temperature. Stopwatches are used to measure intervals of time	Thermometers may only have been seen as a pictorial representation rather than being used to measure temperature. Therefore, they may not read the scales accurately. Children may be confused with how to read the time on a stopwatch in minutes and seconds in digital time. If scientific thermometers are used, there may be some confusion if they have negative temperatures	How could you measure the temperature of a cup of water? How could you measure the time taken to run a race? Why would you use a thermometer to measure temperature, rather than just guess? What does "°C" stand for? How would you know if the temperature increases/decreases? What units can you use to measure time? How do you use a stopwatch to accurately measure time	thermometer – a piece of equipment used to measure temperature stopwatch – a watch with start and stop buttons which can be used to take exact measurements of time beaker – a transparent piece of equipment used to hold and measure liquid temperature – the measure of how hot or cold something is
Session 5	**Plan – measure temperature changes**	Care will need to be taken when children read the thermometer and the stopwatch, especially if they convert minutes and seconds into seconds. Using a bar model may help children to convert between minutes and seconds.	What does "melt" mean? What will you change? What will you measure? What will you keep the same? What equipment will you use and why? How will you record your results?	independent variable (what will change) – the temperature of the water dependent variable (what will be measured) – the time it takes for ice to melt controlled variable (what is kept the same) – the volume of water in the containers, the size of containers, the size and shape of the ice cube and whether the liquid is stirred or not
Session 6	**Investigate – measure temperature changes**	Children may struggle to take multiple accurate readings from a thermometer. When recording their results, the units for temperature (°C) should be put in the table heading and not next to every reading. Children may struggle to form a conclusion from their data.	What are the starting temperatures of the water in container A and container B? What do you notice in container A? How is that different to container B? What are the final temperatures in container A and container B? What did you notice? What does that tell you?	melting – the state change when a solid turns to a liquid thermometer – a piece of equipment used to measure temperature melting point – the temperature at which a given solid will melt stopwatch – a watch with start and stop buttons which can be used to take exact measurements of time
Session 7	**The Water Cycle** A large amount of planet Earth is covered in water. Water is in constant movement through a process called the water cycle. As the water moves it can be in different states of matter. Evaporation is one stage of the water cycle. Evaporation is where a liquid changes state to a gas. Condensation is when a gas changes state to a liquid	Children may think that the Sun absorbs water. Children may think that clouds are a gas (water vapour) and not water/ice droplets in the atmosphere. It is the water that makes clouds visible	What is the process of evaporation? What could increase the rate of evaporation? What is the process of condensation? What is the difference between boiling and evaporation? Dinosaurs such as the T-Rex drank water. How can children in the school have drunk the same water? Why is it important not to waste water? What other ways can you think of to reduce the wasting of water?	The water cycle – the natural recycling and movement of water on planet Earth precipitation – liquid or frozen water that falls back to Earth from the atmosphere. This can be in the form of rain, hail, sleet or snow atmosphere – the layer of gases that surrounds the Earth Global warming – the gradual increase in the Temperature of the Earth Water vapour – the gaseous state of water
Session 8	**Plan – evaporation experiment**	Children may need support with the explanations of why the equipment they have chosen is the most appropriate apparatus. Children may think that evaporation will not occur in any conditions under 100°C	What is evaporation? What will you change? What will you measure? What will you keep the same? What do you predict will happen? Why do you predict that will happen? How will you record your results?	independent variable (what will change) – the temperature of the different locations. dependent variable (what will be measured) – the time it takes for the water to evaporate.
Session 9	**Investigate – evaporation experiment**	Children may choose to use a large volume of water and fill the Petri dish. Choosing a smaller volume of	Does the temperature affect the rate of evaporation? What will you change?	evaporation – the process when a liquid turns to a gas

		water will allow children to observe the evaporation process more easily. Children may confuse the processes of boiling and evaporation. Explain to children that evaporation can occur at any temperature above 0°C.	What will you measure? What will you keep the same? What is the starting temperature in each area? What was your prediction? Did you notice any changes? What were they?	Petri dish – a shallow, circular and transparent dish observations – the method of closely watching something before writing any results and a conclusion data – facts and numerical information collected
Session 10	**Evaluate – evaporation experiment**	Children may think that temperature does not affect the rate of evaporation. Children may think that the water has “disappeared” from the container rather than evaporated	What effect does temperature have on the rate of evaporation? What conclusions can you make from your data? Are there any similarities or differences between your results and the results of other groups? Why do you think this has happened? If you were to repeat this experiment again, how could you improve your results? What questions do you have for further investigation	evaporation – the process when a liquid becomes a gas temperature – the measure of how hot or cold something is conclusion – what has been found during an investigation based on experimental measurements and observations

Curriculum links
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 volume of a sound and the strength of the vibrations that produced it

Working scientifically (Procedural knowledge)
Asking relevant questions and using different types of scientific enquiries to answer them
Recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts and tables
Making systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers.
Setting up simple practical enquiries, comparative and fair tests.
Identifying differences, similarities or changes related to simple scientific ideas and processes

Year 4 – Sound	Declarative (sticky) Knowledge	Possible misconceptions	Key Questions	Vocabulary
Session 1	**Vibrations** A vibration is a quick back-and-forth movement. Sounds are made when objects vibrate. The vibrations travel from the object to our ears. Sounds can be heard when these vibrations reach our ears	Children may think that sound only travels through air. They should be made aware that sound can travel through other mediums, such as solids, liquids and gases. Children could have a discussion around whether sound can be heard through walls or under water to address this.	Which organ in our bodies detects sound? What does "vibration" mean? How do we hear sounds? If you hit a drum harder, what does it do to the sound produced? How does a guitar produce sound when played? How does a drum produce sound when it is hit? Does sound only travel through air? Explain your thinking.	vibration – a quick back-and-forth movement ear – an organ in humans (and many other animals) that detects vibrations, allowing hearing sound – vibrations that travel through the air, or another medium, and are heard when they reach an ear volume – how loud or quiet a sound is pitch – how high or low a sound is
Session 2	**The Ear** Sound vibrations travel through the air. The outer ear funnels the vibrations into the ear canal. The vibrations move down the ear canal. The vibrations are passed to the ear drum. The vibrations from the ear drum are passed along the ear bones and into the cochlea. Signals are then sent to the brain, where they are processed and interpreted as sounds we understand.	Children may find it difficult to understand how vibrations are detected by the ear. Show children how a drum skin vibrates to produce sound and link this to the ear drum in the middle ear. Children may find it difficult to understand how sounds travel through solids, liquids and gases. This is because vibrations cannot be seen, especially in the air.	What is the outer ear? How does the outer ear help us to hear? What is the inner ear? How does the inner ear help us to hear? How does sound travel to the ear? What else does the inner ear help us with? What is the function of the ear drum?	outer ear – the visible part of the ear ear canal – the tube that runs from the outer ear to the ear drum ear bones – tiny bones that transfer vibrations from the ear drum to the inner ear cochlea – a spiral-shaped tube in the inner ear ear drum – a thin layer that can vibrate
Session 3	**Investigate sounds** Sound volume is measured in decibels (dB). A decibel is a measure of the loudness of sounds. A decibel meter can be used to measure the loudness of sounds. If humans are exposed to loud sounds too often, their hearing can be damaged	Children may need support with measuring sound in decibels. If using data loggers or decibel meters, children will need to learn how to use them accurately, as this is the first time they have used this equipment. Children have not yet been introduced to decimals, it is important that they record data from the decibel meters as whole numbers.	How is sound measured? What equipment is used to measure sound? How many decibels is a human talking? How many decibels is a human shouting? How many decibels is the quietest sound a human can hear? What is the level of sound in the classroom? How is that different from the level of sound in the lunch hall/playground? How does the loudness of sound in the classroom change over the day?	sound – vibrations that travel through the air, or another medium, and are heard when they reach an ear volume – how loud or quiet a sound is decibel (dB) – a measure of the loudness of a sound decibel meter – a piece of equipment used to measure the loudness of sound
Session 4	**Explore volume**	Children may find it difficult to make the link between the strength of the vibrations and and the volume of a	What are vibrations? What is volume?	vibration – a quick back-and-forth movement

	A vibration is a quick back-and-forth movement. Sounds are made when objects vibrate. The louder the sound, the bigger the vibration. The quieter the sound, the smaller the vibration	sound. To clarify this, use rice on top of a drum skin to allow children to see if it is struck with a greater force, there is greater movement of the rice grains.	How can you increase the volume of a sound? How can you decrease the volume of a sound? How do wooden blocks produce a louder sound than ice cubes? Do bigger or smaller vibrations produce louder sounds? How do different materials insulate sound? Which material would be the best insulator of sound? Why? How will you measure the volume of a sound?	volume – how loud or quiet a sound is insulate – to protect something from the transfer of heat, sound or electricity decibel (dB) – the measurement of the loudness of a sound decibel meter – a piece of equipment used to measure the loudness of sound
Session 5	**Explore pitch** Pitch means how high or low a sound is. High-pitched sounds produce faster or more frequent vibrations. Low-pitched sounds produce slower or less frequent vibrations. There are different ways to change the pitch of an instrument.	Children may think that the pitch of an instrument can only be changed in one way. Demonstrate to children that it can be changed in different ways using lengthening/shortening strings or using more or fewer fingers on holes in the instrument	What is “pitch”? When you hit different pans, why do they make different sounds? When you pluck the strings on a guitar, which strings have a high pitch and which strings have a low pitch? What happens to the pitch of the string when it is tightened and loosened? When an elastic band is plucked, how can the pitch be changed? How can the pitch of a musical instrument with no strings, such as a trumpet, be changed?	pitch – how high or low a sound is high-pitched – describes a high sound low-pitched – describes a low sound sound – vibrations that travel through the air or another medium and are heard when they reach an ear
Session 6	**Plan – volume experiment**	Children should be aware that background noise can affect the investigation.	What does “volume” mean when thinking about sound? What measurement is used to record the loudness of a sound? What measurements are used to record distance? What will you change in this experiment? What will you measure in this experiment? What will you keep the same? How will you record your results?	independent variable (what will change) – the distance from the sound source dependent variable (what will be measured) – the volume of the sound heard in decibels controlled variables (what is kept the same) – the volume of the sound source and the level of background noise (wherever possible)

Curriculum links –

Working scientifically (Procedural knowledge)

Year 4 – Electricity	Declarative (sticky) Knowledge	Possible misconceptions	Key Questions	Vocabulary
Session 1	**Explore electricity**			
Session 2	**Common appliances that use electricity**			
Session 3	**Build and draw series circuits**			
Session 4	**What has gone wrong?**			
Session 5	**Conductors and insulators**			
Session 6	**Conductivity within a circuit**			

Year 4 LESSON OVERVIEWS (Declarative & Procedural knowledge)

Curriculum links –

Working scientifically (Procedural knowledge)

Year 4 – Energy	Declarative (sticky) Knowledge	Possible misconceptions	Key Questions	Vocabulary
Session 1	**What is energy?**			
Session 2	**How can we reduce our energy usage?**			

Year 4 LESSON OVERVIEWS (Declarative & Procedural knowledge)

Curriculum links –

Working scientifically (Procedural knowledge)

Year 4 – Habitats	Declarative (sticky) Knowledge	Possible misconceptions	Key Questions	Vocabulary
Session 1	**Living things and their habitats**			
Session 2	**Classification keys (animals)**			
Session 3	**Classification keys (plants)**			
Session 4	**Human impact on habitats**			

Year 4 LESSON OVERVIEWS (Declarative & Procedural knowledge)

Curriculum links –

Working scientifically (Procedural knowledge)

Year 4 – Deforestation	Declarative (sticky) Knowledge	Possible misconceptions	Key Questions	Vocabulary
Session 1	**What is deforestation?**			
Session 2	**What are the impacts in the Uk and the rest of the world?**			

Year 4 LESSON OVERVIEWS (Declarative & Procedural knowledge)

Curriculum links –

Working scientifically (Procedural knowledge)

Year 4 – The Digestive System	Declarative (sticky) Knowledge	Possible misconceptions	Key Questions	Vocabulary
Session 1	**Teeth – carnivores, herbivores and omnivores**			
Session 2	**Human teeth**			
Session 3	**Layers of the teeth**			
Session 4	**Plan – tooth decay experiment**			
Session 5	**The digestive system – mouth and oesophagus**			
Session 6	**The digestive system – stomach and small intestine**			
Session 7	**The digestive system - – large intestine and rectum**			
Session 8	**The digestive system**			
Session 9	**Findings – tooth decay experiment**			

Year 4 LESSON OVERVIEWS (Declarative & Procedural knowledge)

Curriculum links –

Working scientifically (Procedural knowledge)

Year 4 – Food Chains	Declarative (sticky) Knowledge	Possible misconceptions	Key Questions	Vocabulary
Session 1	**What is a food chain?**			
Session 2	**Interpret food chains**			
Session 3	**Draw food chains**			
Session 4	**What would happen if?**			

Year 5 LESSON OVERVIEWS (Declarative & Procedural knowledge)

Curriculum links –
Identify the effects of air resistance, water resistance and friction that act between moving surfaces.
Recognise that some mechanisms, including levers, pulley
Working scientifically
– Use relevant scientific language and illustrations to discuss, communicate and justify their scientific ideas (non-statutory).
Recognise which secondary sources will be most useful to research their ideas (non-statutory).
Planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary.
Talk about criteria for grouping, sorting and classifying (non-statutory).

Year 5– Forces	Declarative (sticky) Knowledge	Possible misconceptions	Key QUestions	Vocabulary
Session 1	**Friction** Friction can stop or slow down a moving object. A stationary object will only move when the force applied is greater than the friction, which acts in the opposite direction to the movement. Friction produces heat, which we feel when we rub our hands together. Friction can cause some materials to wear away, such as pencils. Friction has many useful applications, such as in vehicle brakes, using sandpaper and walking on firm ground.	Children may think friction only occurs when two surfaces are moving. Clarify that friction occurs even when the two surfaces are not moving. They may think that friction only occurs between rough surfaces. It also occurs between smooth surfaces such as glass.	What is meant by a force? What is meant by a contact force? What is friction? How is friction caused? What are some examples of where friction occurs? How can friction help us? What happens when two sticks are rubbed together? Does friction only occur between rough surfaces? Explain how you know	**force** – Pushes and pulls in a certain direction. A force can change the speed or shape of an object. **contact force** – A force between two objects that are touching each other. **friction** – The contact force between two surfaces that are touching each other. **motion** – The process of an object moving in a certain direction.
Session 2	**Air resistance** Air resistance is a friction force between the air and a moving object. Air resistance is greater when the surface area of the moving object is large. Parachutes have a large surface area, so they have a greater air resistance and slow the skydiver down. Air resistance increases with speed.	When planning the investigation, children may confuse the variables. Children may need extra support when identifying the equipment that is most suitable to use in their experiment. Children may need to recap how to use a stopwatch to record time accurately.	What is air resistance? What does air resistance do to moving objects? Why is air resistance a friction force? What happens when a skydiver opens their parachute? How are aeroplanes and trains designed to reduce air resistance? Why is it important for trains and aeroplanes to reduce air resistance when travelling at speed? How does speed affect the amount of air resistance	**air resistance** – A type of friction between air and another object. **drag** – Another word used as an alternative to air resistance. **parachute** – An object that slows a skydiver down. **force** – Pushes and pulls in a certain direction. A force can change the speed or shape of an object.
Session 3	**Plan – Parachute experiment**	When planning the investigation, children may confuse the variables. Children may need extra support when identifying the equipment that is most suitable to use in their experiment. Children may need to recap how to use a stopwatch to record time accurately.	How will the parachute be designed? What materials and equipment are needed? Which variable will you change (the independent variable)? Which variable will you measure (the dependent variable)? Which variables will you keep the same (the control variables)? Make a prediction. What do you think will happen	**independent variable** (what will change) – The surface area of the parachute. **dependent variable** (what will be measured) – The time taken for the parachute to fall to the ground. **controlled variables** (what is kept the same) – The material that the three parachutes are made from, the object that is attached to both parachutes, and the height that the parachutes are dropped from.

Session 4	**Investigate – parachute experiment**	Children may think that if an animal does not have a spine, then it cannot move. Children may believe that animals without a spine have no form of skeleton. Children may think that all spineless animals have an exoskeleton. They should be shown a range of animals without a spine or exoskeleton to address this misconception, e.g. a slug.	What is your prediction? What do you think will happen in the investigation? Why? Why is it important to drop the parachutes from the same height? How will the results from the investigation be recorded? How will the results from the investigation be reliable?	**spine** – A group of small bones stacked on top of each other in the back, also known as the "backbone". **antennae** – The organ on an insect's head that it uses to touch and smell. **insect** – A small animal that has three body sections, six legs and antennae. **exoskeleton** – A form of skeleton on the outside of an animal's body that provides support and protection.
Session 5	**Evaluate – parachute experiment**	If the investigation does not properly test what it is meant to, then repeating it again will not improve the results. • Children may not have a clear understanding of the terms anomalous results and repeatability. Ensure children are confident with these terms stated in the key vocabulary.	What was your prediction? How does the surface area of the parachute affect the amount of air resistance? Did your results match your prediction? Why/why not? How could the investigation be improved? What could be done differently to improve the results?	surface area – The total area of the surface of an object. anomalous result – A result that does not fit the pattern. In maths, this is called an "outlier". repeatability – The likelihood of getting similar results if the experiment is carried out again precision – When all of the measurements obtained in an experiment are close to each other
Session 6	**Plan – water resistance**	Children may think that water resistance only occurs in water and not in other liquids. Discuss ways they can improve their experiment plan, such as controlling variables and repeating their results to reduce the effects of anomalous results.	What is water resistance? How can water resistance be reduced? What does "streamline" mean? Which shape is the most streamlined? Which shape do you predict will have the least/most water resistance? What is the independent variable? What is the dependent variable? What are the controlled variables?	independent variable (what will change) – The shape of the object being dropped in the water. dependent variable (what will be measured) – The time taken for the object to sink to the bottom. controlled variables (what is kept the same) – The mass of the three objects, the type of liquid into which the objects are dropped (water), the height the objects are dropped
Session 7	**Investigate – water resistance**	Children may think that water resistance must always have water to create a force against an object, but water resistance can occur in any liquid. Children may think that water resistance is not a type of friction. Clarify that water resistance is a type of friction as the water reduces the speed of the object	What is water resistance? How can water resistance be reduced? What does streamline mean? Why is water resistance a type of friction force? Which shape is the most streamlined? Which shape will have the least water resistance? Why? Which shape will have the most water resistance? Why? Why is it important to keep the mass of the modelling clay the same?	water resistance – A type of force caused by friction slowing things down that are moving through a liquid. Water resistance occurs in all liquids, not just water. streamlined – Having a shape that has little resistance to a flow of air or water. repeatability – The likelihood of getting similar results if the experiment is carried out again. precision -when all of the measurements obtained in an experiment are close to each other

Session 8	**Explore gravity** Gravity is a non-contact force. Gravity is an invisible force that pulls things to the centre of the Earth (or other planets). Heavier objects do not fall to the ground quicker than lighter objects	Children may think that heavier objects will fall to the ground quicker than lighter objects. Children often think that there is no gravity in space as astronauts are often shown floating around. There is gravity in space. The gravitational pull on the Moon from the Earth stops the Moon drifting off into space	What is gravity? Why is gravity described as a non-contact force? Do you predict heavier or lighter objects will fall to the ground quickest? Why? How will you test to see whether heavier objects fall to the ground quicker than lighter objects? What will you change and keep the same? What were your results	gravity – An invisible force that pulls things to the centre of the Earth (or other planets). weight – The pull of gravity on an object. contact force – A force that requires direct physical contact between two objects. non-contact force – A force that does not require physical contact between two objects
Session 9	**Use small forces for greater effect** Levers, pulleys and gears are all mechanisms that will allow a smaller force to have a greater effect. Gears are wheels with teeth that allow a small force to produce a larger force with greater speed. A lever is a machine that allows movement of heavy objects. Pulleys use a rope or cable through a wheel to allow lifting of heavy objects.	Children may believe that the larger the gear and the more teeth it has, then the faster the movement will be. Use as many real life examples of gears, levers and pulleys to help children understand this concept. Examples include gears on a bike, seesaws and exercise equipment	What is a gear? How do gears work? What is a lever? How do levers work? What is a pulley? How does a pulley work? How do levers, pulleys and gears work to allow a smaller force to have a greater effect? Where can you find examples of levers, pulleys and gears in everyday life? Why do you need a greater force when using a smaller lever? Do larger or smaller gears create a faster rotation?	lever – A rigid bar resting on a pivot, used to move a heavy load. gear – A wheel and axle that has teeth along the wheel, mostly used in machines to increase speed. pulley – A rope or a cable on one or more wheels, used to lift heavy objects. machine – A device that does a particular task. Some machines make moving or lifting things easier

Year 5 LESSON OVERVIEWS (Declarative & Procedural knowledge)

Curriculum links –
Describe the movement of the Earth and other planets relative to the Sun in the Solar System
Describe the Sun, Earth and Moon as approximately spherical bodies
Working scientifically (Procedural knowledge)
Identifying scientific evidence that has been used to support or refute ideas or arguments
Use relevant scientific language and illustrations to discuss, communicate and justify their scientific ideas (non-statutory)
Reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions
Recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs.

Year 5 – Space	Declarative (sticky) Knowledge	Possible misconceptions	Key Questions	Vocabulary
Session 1	**The Solar System** The Sun, Earth, Moon and other planets are approximately spherical bodies. The Solar System is a collection of planets, moons and the Sun. The Sun is a star which releases heat and light. The Sun is at the centre of the Solar System	They may think that there is more than one star in the Solar System. Clarify that the only star in the Solar System is the Sun. Children may think that Pluto is a planet. Explain that Pluto was reclassified as a dwarf planet as it is not big enough to be regarded as a planet	What are the different parts that make up the Solar System? • What is a star? • What is the name of the star in our Solar System? • What is a satellite? • What is the name of the satellite that orbits the Earth? • How many planets are there in the Solar System	The Solar System – A collection of the eight planets and their moons, which orbit the Sun. planets – Large, natural objects that orbit stars, such as the Sun. spherical – Shaped like a sphere. stars – Large balls of burning gas that release heat and light. sun – The star at the centre
Session 2	**The Planets** There are eight planets that orbit the Sun. Mercury, Venus, Earth and Mars all have solid surfaces. Jupiter, Saturn, Uranus and Neptune have gas surfaces. Pluto is considered a dwarf planet	Children may believe that the Earth is larger than the Sun. They may think that all planets have hard rocky surfaces like Earth. Children may believe that the Earth is the only planet with a Moon. The Earth has one Moon but different planets can have more than one moon. For example, Uranus has 27 moons	How many planets are there in the Solar System? What is the order of the planets? What do the planets orbit in the Solar System? What is similar about the first four planets? What are the differences? What is similar about the last four planets? What are the differences	planets – Large, natural objects that orbit stars such as the Sun. orbit – The path an object takes around another object, for example the Earth goes around the Sun. surface – The outer layer of something. In terms of space, the land or ground of a planet. Appearance – The way something looks. In terms of
Session 3	**Modelling** The Solar System is a collection of planets, moons and the Sun. The Earth and other planets orbit the Sun. Scientific models are physical representations of ideas or processes. Models can be created in different ways to represent the Solar System and planets.	Children may believe that all planets are the same size. They may think that all planets are the same distance from the Sun. They may believe that the Sun is the same size as the planets.	What is a model in science? Why are models used in science? What does the model of the Solar System help to show? What are the advantages of the Solar System model? What are the disadvantages of the Solar System model? Which is a better representation of the Solar System and why	sun – The star at the centre of our Solar System that releases heat and light. planets – Large, natural objects that orbit stars such as the Sun. Model – A physical representation of an idea or process. orbit – The path an object takes around another object, for example the Earth goes around the Sun

Session 4	**Motion of the Earth and Planet** The Sun is the largest object in the Solar System and has the greatest gravitational pull. This keeps all the planets in orbit around the Sun. The Earth takes 365 days, or one year, to complete one full orbit. Other planets take different amounts of time to complete a full orbit around the Sun. This is relative to their distance from the Sun	Children may believe that it takes every planet 365 days to orbit the Sun. Explain that each planet has its own number of days or years to go around the Sun. For example, it takes Earth 365 days, but Jupiter takes the equivalent of 12 Earth years to orbit the Sun. Children may need support when drawing a bar graph from a given set of data.	What do the Earth and planets in the Solar System orbit? How is the Sun able to keep the planets in orbit? Why does Mercury take the least amount of time to orbit the Sun? Why does Neptune take the longest time to orbit the Sun? What would happen if the Sun was not present in the Solar System	gravity – An invisible force that pulls things to the centre of the Earth (or other bodies such as planets or the Sun). gravitational pull – The force of attraction towards the centre of a planet or the Sun. orbit – The path an object takes around another object, for example the Earth orbits the Sun. heliocentric – A model that proposed that the Sun was at the centre of the Solar System. The activity highlighted in the practical ideas section can help children to understand why it takes the planets different lengths of time to orbit the sun
Session 5	**The Solar System – ideas over time** Different scientists and mathematicians have contributed to our understanding of the Solar System over time. It was initially thought that the Earth was at the centre of the Solar System. Through scientific advances, we now know that the Sun is at the centre of the Solar System	Children may believe that planets cannot be seen without a telescope. They may believe that the Earth is flat. Explain that this was once thought but is no longer believed. Children may think that the Earth is at the centre of the Solar System. Explain that the Sun is at the centre of the Solar System with the eight planets orbiting the Sun	Who was Aristotle/Ptolemy/Copernicus and what ideas did he have about the Solar System? • What are the similarities and differences between the geocentric and heliocentric models? • How have Galileo and Sir Isaac Newton improved our understanding of the Solar System?	geocentric – A model that proposed that the Earth was at the centre of the Solar System. heliocentric – A model that proposed that the Sun was at the centre of the Solar System. spherical – Shaped like a sphere. planets – Large, natural objects that orbit stars such as the Sun.
Session 6	**Planet Earth** he Earth's axis is an imaginary line (that is slightly tilted) that runs from the North to the South Pole. The Earth rotates once around its axis in a 24 hour period. Earth is the only known planet to support plant and animal life. The four seasons occur on planet Earth because the Earth's axis is tilted.	They may believe that the Sun rotates around the Earth. Children may think that the Earth is the largest object in the Solar System, not the Sun. They may think that other planets can support life. Explain that currently the Earth is the only planet in the Solar System that is known to be able to support life.	What does the Earth orbit? • What is the Earth's axis? • What is meant by the Earth rotating "on its axis"? • How long does it take for the Earth to rotate once on its axis? • What are the names of the four seasons on Earth? • How do the seasons occur on Earth	axis – An imaginary line that runs from the North Pole to the South Pole. The Earth's axis is slightly tilted. rotation – The spinning of the Earth around its axis. The Earth rotates once every 24 hours. North Pole – The northernmost point on the Earth's axis. South Pole – The southernmost point on the Earth's axis. axis North Pole South Pole direction of spin orbit – The path an object takes around another object, for example the Earth orbits the Sun

Year 5 LESSON OVERVIEWS (Declarative & Procedural knowledge)

Curriculum links –

Working scientifically (Procedural knowledge)

Year 5 – Global Warming	Declarative (sticky) Knowledge	Possible misconceptions	Key Questions	Vocabulary
Session 1	**What is global warming?** The greenhouse effect is caused by greenhouse gases trapping heat from the Sun. This leads to global warming. Global warming can lead to glaciers and ice caps melting. This can cause sea levels to rise, leading to flooding. Global warming can change weather patterns and can lead to drought or flooding. Drought and flooding make it hard to grow crops.	Children may think that global warming and climate change are the same thing. Clarify to them that "global warming" refers to the gradual increase in the Earth's temperature. This can lead to climate change and different weather patterns.	What is global warming? What are greenhouse gases? What is the greenhouse effect? How are greenhouse gases released into the Earth's atmosphere? What are fossil fuels? How have human activities contributed to global warming? What is climate change?	global warming – the gradual increase in the Earth's temperature greenhouse gases – gases that trap heat from the Sun and cause the Earth to warm up fossil fuels – coal, oil and natural gas that can be burned to power cars and generate electricity climate change – long term changes in the temperature and weather patterns of Earth
Session 2	**What is the impact of global warming on living things?** Global warming affects plants, animals and humans. Global warming and climate change can cause icy habitats to melt due to increasing temperatures. Animals (including humans) and plants are affected by flooding and drought caused by global warming	Children may think that only humans are affected by global warming. Discuss with them how plants and other animals are also affected.	What is global warming? What are the effects of global warming on the Earth? What is a carbon footprint? What can we do to reduce our carbon footprint? What are habitats? What are the effects of global warming on humans? What are the effects of global warming on animals? What are the effects of global warming on plants?	global warming – the gradual increase in the Earth's temperature glaciers – large, thick masses of ice ice cap – a small type of glacier habitat – an area where animals and plants live climate change – long term changes in the temperature and weather patterns of Earth

Year 5 LESSON OVERVIEWS (Declarative & Procedural knowledge)

Curriculum links
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.

Working scientifically (Procedural knowledge)
Use and develop keys and other information records to identify, classify and describe living things and materials (non-statutory).
Recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs
Taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate
Using test results to make predictions to set up further comparative and fair tests.

Year 5 – Properties of material	Declarative (sticky) Knowledge	Possible misconceptions	Key Questions	Vocabulary
Session 1	**Test materials - magnetic. Transparency and hardness** Materials can be transparent, translucent or opaque. A harder material will scratch a softer material. Most metals are non-magnetic. Only a few metals are magnetic, such as iron and steel.	Children may think that all metals are magnetic. Children may be familiar with the terms “transparent” and “opaque”. However, they may find the term “translucent” difficult to understand. Children may think that all solids and metals are hard.	What does “magnetic” mean? Is _____a magnetic material? Are all metals magnetic? What do the terms “translucent”, ”transparent” and “opaque” mean? How could two materials be tested to see which one is the hardest? Which material do you think is the hardest?	transparent – an object or material that allows all light to pass through it translucent – an object or material that allows some light to pass through it opaque – an object or material that does not allow any light to pass through it magnetism – a non-contact force created by a magnet hardness – a measure of how resistant a solid is to a change of shape or indentation when a force is applied
Session 2	**Test materials – electrical conductivity** An electrical conductor is a material that allows electricity to flow through it. An electrical insulator is a material that does not allow electricity to flow through it. Metals are good electrical conductors. Plastic, wood and paper are electrical insulators.	Children may think that only metals are conductors of electricity. Children have built circuits in Year 4. However, they may need some guidance on how to build a working series circuit before testing materials	What does “electrical conductor” mean? What does “electrical insulator” mean? What components are needed in a complete circuit? Is a conductor of electricity? How would you know that is a conductor of electricity? Electrical wires are covered with a plastic casing. Why is plastic used?	electrical conductor – a material that lets electricity pass through it electrical insulator – a material that does not let electricity pass through it circuit – a complete path that allows electrical energy to flow cell – a single device which produces electricity bulb – a part in a circuit that produces light
Session 3	**Plan – insulation heat experiment**	Children may think that insulators are only used to keep things warm. They can also keep things cold. Ice melts when the heat in a room is transferred to the ice. An insulator slows down this transfer of heat.	What is a thermal insulator? When would you need to keep something hot? When would you need to keep something cold? What are the independent, dependent and controlled variables in this experiment? What equipment will you use and why? How will you record your results?	independent variable (what will change) – the material that the beaker is wrapped in dependent variable (what will be measured) – the temperature of the water over time controlled variable (what is kept the same) – the temperature of the water in each beaker at the start of the experiment, the number of layers of insulation wrapped around the beakers, the volume of water in the beakers and the shape and size of the beakers

Session 4	**Test – insulating heat experiment**	When setting up the experiment, the temperature of the water should not exceed 50°C to align with health and safety regulations. Children may think that their results are inaccurate once all four beakers have reached room temperature and the temperature in each beaker is the same.	What is a thermal insulator? What is your experiment plan? What is your prediction for the experiment? Why was one of the beakers not covered in insulation? What did you notice about the temperature of all four beakers at the end of the experiment?	thermal insulator – material that does not let heat pass through it quickly/efficiently/easily thermometer – a piece of equipment used to measure temperature control beaker – a beaker that is not wrapped in material so it can be used for comparison with other beakers temperature – the measure of how hot or cold something is
Session 5	**Evaluate – insulating heat experiment**	Children may think that the experiment is inaccurate as heat has been lost due to the beakers having open tops. Use this as a point within the evaluation step to discuss how to make the experiment more reliable if they were to undertake it again.	What do the results tell you about which material is the best insulating material? If you were to repeat this experiment, how could you improve your results? How could you make your results more reliable? What questions do you have for further investigation?	thermal insulator – material that does not let heat pass through it quickly/efficiently/easily data – facts and numerical information collected temperature – a measure of how hot or cold something is conclusion – what has been found out during an investigation anomalous result – a result that does not fit in with the pattern of the other results
Session 6	**Uses of everyday materials – plastic, wood and metal**	Children may think that an object can only be made from one material. Show examples of objects that are made from a mixture of multiple materials and discuss their suitability for purpose.	What is an electrical conductor? What is an electrical insulator? What is a thermal insulator? What object is this? What material is it made from? What other materials could this object be made from? • Why is a suitable material for a ? • Why would be unsuitable for a ?	properties – the qualities and characteristics of a material wood – a natural material that is generally hard and comes from the stem or branches of trees and shrubs metal – a material that can typically conduct electricity and heat plastic – a man-made material that is often strong, lightweight and can be formed into many shapes lifespan – the length of time that a material or object is useful for before it must be replaced

Year 5 LESSON OVERVIEWS (Declarative & Procedural knowledge)

Curriculum links –
Describe the changes as humans develop to old age
Working scientifically (Procedural knowledge)
Planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary.
Recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs
Use relevant scientific language and illustrations to discuss, communicate and justify their scientific ideas (non-statutory).
Identifying scientific evidence that has been used to support or refute ideas or arguments
Reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of and a degree of trust in results, in oral and written forms such as displays and other presentations

Year 5 – Animals including Humans	Declarative (sticky) Knowledge	Possible misconceptions	Key Questions	Vocabulary
Session 1	**The Human Life Cycle** The human life cycle has six main stages – foetus, baby, child, adolescent, adult and elderly adult. Every human goes through the same life stages in the same order. All humans start their life as a foetus inside their mother's womb. After puberty, humans can reproduce.	Children often think that a foetus grows in the mother's stomach rather than in the womb. Children may think a baby and a foetus are the same thing.	What are the six stages of the human life cycle? Around what age is a human described as a baby? Around what age is a human described as a child? In which life stages do humans grow the most? What is the difference between a foetus and a baby? How might a human look different as an elderly adult compared to an adult? During which stage of the human life cycle might a human have a baby? Where does a foetus grow and develop?	adolescent – the stage between early childhood and adulthood from around age 11 to 17 baby – from birth to around 1 year old foetus – an unborn baby growing inside the mother's womb elderly adult – a person who is over the age of 65 adult – from around age 18 onwards life cycle – a series of stages a living thing goes through during its life
Session 2	**Babies and children** Babies are dependent on adults for food, warmth and comfort. Most babies and toddlers hit certain milestones in their first two years of life, such as crawling and walking. Throughout childhood, children grow and develop at a rapid rate in terms of their mass, height and brain development.	Children may think that all babies hit milestones at exactly the same time. Children may think that all babies are the same length and mass when they are born	Around what age will most babies start to crawl? Around what age will most babies start to walk? Do all babies hit milestones at the same age? How do babies communicate their needs? Why does a baby depend on an adult? When does a foetus become a baby? How does the length of a baby change as age increases? How does the mass of a baby change as age increases?	milestone – a signify cant event in a person's baby – from birth to around 1 year oldlife toddler – a young child who is between 1 and 3 child – a young human below the age of puberty womb – the organ in mammals in which a baby develops
Session 3	**Adolescence and puberty** Puberty is the process that prepares humans for reproduction. Hormones are chemicals that are released by your body during puberty which cause physical and emotional changes. Key changes that happen to females during puberty include the start of periods, growth of underarm and pubic hair, mood swings, spots and growth of breasts.	Children may think that puberty begins at the same age for every person. Explain to children that it usually happens between the ages of 8 and 16. On average, girls start puberty two years before boys. Children may think that all physical changes happen quickly. Children should be aware that puberty is a gradual process that happens over several years.	What is puberty? On average, what age do girls start puberty? On average, what age do boys start puberty? Do girls and boys start puberty at the same time? What key changes happen to girls during puberty? What key changes happen to boys during puberty? What key changes happen to both boys and girls during puberty? Why is puberty important? What are hormones?	adolescent – the stage between childhood and adulthood, from around age 11 to 17 period – normal bleeding from the vagina that is part of a female's monthly cycle reproduce – to produce offspring puberty – the process that prepares humans for reproduction hormone – a chemical released by the body that causes physical and emotional changes during puberty

	Key changes that happen to males during puberty include growth of body hair, growth of the penis and testicles, spots, mood swings and deepening of the voice.			
Session 4	**Adults and the elderly** A person is classed as an adult from age 18 onwards. A person is classed as an elderly adult from approximately 65 When a person enters adulthood, their rate of growth slows down and their body is fully developed. The human body gradually changes with age. For example, skin loses elasticity, resulting in wrinkles, bones may become weaker and height may decrease	Children may think that all humans have the same life expectancy. Explain that life expectancy varies among humans for many different reasons such as health, sex and where you live. Children may think that all humans experience the same physical changes at the same time as they age. Explain that a variety of factors can influence this, such as exercise and keeping your brain active	What age is a human classed as an adult? What age is a human classed as an elderly adult? What physical changes occur in adulthood? What physical changes occur in late adulthood? In which life stage is a human most likely to reproduce? Why is an elderly person more likely to break bones? Do all humans have the same life expectancy? Why do wrinkles develop in adulthood? What advice would you give to an elderly person to help them stay healthy?	adult – from around age 18 onwards elderly adult – a person who is over the age of 65 reproduce – to produce offspring life expectancy – the average time a person may expect to live
Session 5	**Gestation periods of mammals** Humans are mammals because they are warm-blooded, give birth to live young and feed their offspring on milk. Gestation is the period of time that a foetus develops in its mother's womb. Mammals have different gestation periods. The gestation period of a human is approximately nine months	Children may think that all mammals have the same gestation period. Usually, the larger the mammal the longer the gestation period. Clarify to children that there are some exceptions, such as the blue whale's gestation period of 12 months compared to the African elephant's gestation period of 22 months.	What is a mammal? Why are humans classed as mammals? What is gestation? What are offspring? Approximately how long is the gestation period of a human? Which mammal has the longest/shortest gestation period? Can you identify any patterns when comparing the gestation periods of different mammals?	womb – the organ in mammals in which a baby develops foetus – an unborn baby growing inside the mother's womb gestation – the period of time that a foetus develops in its mother's womb mammal – an animal with a spine and with fur or hair on its body, which gives birth to live young and feeds its young on milk offspring – the young of a living thing
Session 6	**Gestation periods and lifespan** The lifespan of an animal is how long the animal is alive. Usually, the longer the gestation period of an animal, the longer the lifespan. Humans have a relatively short gestation period compared to their lifespan.	Children may think that there is no correlation between the length of an animal's gestation period and its lifespan. Usually, the longer the gestation period of an animal, the longer the lifespan. However, there are some animals that do not fit this pattern and have relatively short or long gestation periods compared to their lifespans.	What does lifespan mean? What is the gestation period of this animal? What is the lifespan of this animal? Is there a relationship between the gestation period of an animal and its lifespan? What is an anomaly? What conclusions can you draw from the data?	gestation – the period of time that a foetus develops in its mother's womb lifespan – the period of time that an animal is alive correlation – a relationship between two or more things anomaly – something that does not fit the pattern

Year 5 LESSON OVERVIEWS (Declarative & Procedural knowledge)

Curriculum links –

Working scientifically (Procedural knowledge)

Year 5 – Life Cycles	Declarative (sticky) Knowledge	Possible misconceptions	Key Questions	Vocabulary
Session 1	**Life Cycles of Mammals**			
Session 2	**Life Cycles of Amphibians (frogs)**			
Session 3	**Life Cycles of Insects**			
Session 4	**Life Cycles of Birds**			

Year 5 LESSON OVERVIEWS (Declarative & Procedural knowledge)

Curriculum links –

Working scientifically (Procedural knowledge)

Year 5 – Reproduction A	Declarative (sticky) Knowledge	Possible misconceptions	Key Questions	Vocabulary
Session 1	**Sexual reproduction in animals**			
Session 2	**Reproductive parts in plants**			
Session 3	**Pollination**			
Session 4	**Asexual reproduction**			
Session 5	**Plan – cloning plants**			
Session 6	**Plant – cloning plants**			

Year 5 LESSON OVERVIEWS (Declarative & Procedural knowledge)

Curriculum links –

Working scientifically (Procedural knowledge)

Year 5 – Reversible and irreversible changes	Declarative (sticky) Knowledge	Possible misconceptions	Key Questions	Vocabulary
Session 1	**Dissolving**			
Session 2	**Separate materials – filtering and sieving**			
Session 3	**Solutions and evaporating**			
Session 4	**Reversible changes**			
Session 5	**Irreversible changes – burning**			
Session 6	**Irreversible changes – acid**			

Year 5 LESSON OVERVIEWS (Declarative & Procedural knowledge)

Curriculum links –

Working scientifically (Procedural knowledge)

Year 5 – Plastic Pollution	Declarative (sticky) Knowledge	Possible misconceptions	Key Questions	Vocabulary
Session 1	**What is plastic pollution?**			
Session 2	**What are the impacts of plastic pollution on the planet?**			

Year 5 LESSON OVERVIEWS (Declarative & Procedural knowledge)

Curriculum links – **Working scientifically (Procedural knowledge)**

Year 5 – Reproduction B	**Declarative (sticky) Knowledge**	**Possible misconceptions**	**Key Questions**	**Vocabulary**
Session 1	**Answer questions – cloning plants**			
Session 2	**Present findings – cloning plants**			
Session 3	**Evaluate – cloning plants**			

Year 6 LESSON OVERVIEWS (Declarative & Procedural knowledge)

Curriculum links –
Describe how living things are classified into broad groups according to common observable characteristics and based on similarities and differences, including microorganisms, plants and animals.
Give reasons for classifying plants and animals based on specific characteristics

Working scientifically (Procedural knowledge) Identifying scientific evidence that has been used to support or refute ideas or arguments.
– Use and develop keys and other information records to identify, classify and describe living things (non-statutory)

Year 6 – Living things & their habitats	Declarative (sticky) Knowledge	Possible misconceptions	Key Questions	Vocabulary
Session 1	**Conditions for life** A living organism moves, reproduces, grows and excretes. The stem of a plant moves towards the strongest light source and the roots move away from light. Plants can reproduce sexually and asexually	Children may think that animals move and plants do not. It is important to state to them that plants do move, they move towards sunlight. There is often confusion in differentiating between living and non-living things. To address this, use examples such as animals, plants and rocks to discuss with children why the examples are living or non-living	What is an organism? What do animals and plants need to survive? How do animals and plants get their food? How do you know if something is living? How do you know if something is non-living? How can you group these organisms based on their conditions for life? How are the conditions for life similar or different in plants and animals	organism - A living thing such as an animal or a plant. excretion – The removal of waste products. reproduction – The production of offspring, either sexually or asexually. living – An organism that moves, reproduces and grows non-living – Things that
Session 2	**Group Organisms** Vertebrates can be grouped as mammals, birds, fish, amphibians and reptiles. Plants can be grouped as flowering and non-flowering. Flowering plants produce flowers and fruits. Non-flowering plants do not. Scientists group organisms to organise animals and plants based on their features. Grouping organisms can help us understand how organisms are related to each other	Children may think that all animals in the sea are fish. Clarify to them that mammals, such as whales, are also found in the sea. They may think that all plants have flowers. Remind children that some plants are non-flowering, such as mosses and ferns	What is an organism? What are vertebrates and invertebrates? What are the features of different vertebrate groups? How do scientists group invertebrates? Which of these plants are flowering or non-flowering? How can you group these organisms? How many ways can you think of	organism – A living thing such as an animal or a plant. vertebrate – An animal with a spine. invertebrate – An animal without a spine. flowering plant – A plant that can produce flowers and fruit. non-flowering plant – A plant that does not produce flowers and fruit

Session 3	**Classify Animals** Classification keys are used to classify animals. Classification keys can be used to identify different unknown animals based on their features, such as number of legs, having fur or scales. A classification key is made up of several questions with yes or no answers. These questions can then lead to further questions and answers until the identity of the animal is determined	This can lead to some children incorrectly classifying animals. For example, they may believe that whales are fish. Children may classify animals based on whether they can move or where they live. Highlight to children that organisms are classified according to their features, such as number of legs or having scaly skin.	What are classification keys? Why are classification keys important? How are animals classified? What questions can be used to create classification keys for animals? What are open/closed questions	Classification – Method of arranging organisms into groups. Classification key – A way of separating organisms into groups or types. Yes No Molluscs – A soft bodied invertebrate, including slugs and snails. Arachnids – An invertebrate with two body parts and eight legs, including spiders and scorpians.
Session 4	**Classify Plants** Classification keys can be used to classify plants. They can be used to identify different unknown plants based on their features. Plants can be classified in several ways. Trees can be classified as deciduous, evergreen and coniferous	Children may classify plants based on what they can clearly see, such as stem and flowers. For example, they may classify a mushroom as a plant by stating it has a stem. It is important to clarify to children what coniferous trees are and to provide examples such as pine trees	What are the features of flowering and non-flowering plants? What are the differences between deciduous and evergreen trees? What are the features of coniferous trees? What are the different ways that scientists classify plants? What questions can be used to create classification keys for plants	flowering plant – A plant that produces flowers and fruit. on-flowering plant – A plant that does not produce flowers and fruit. deciduous trees – Trees that lose their leaves during winter. evergreen trees – Trees that do not lose their leaves during winter. coniferous trees – Trees that produce cones instead of flowers.
Session 5	**Microorganisms** A microorganism is tiny and can be seen using a powerful microscope. Bacteria are simple, invisible (to the eye) microorganisms. Some bacteria can cause diseases and infections. Humans have good bacteria in their bodies which help to digest food. Viruses are invisible (to the eye) microorganisms and need a host. They can cause diseases such as flu or a common cold. Some fungi are microorganisms which may cause some infection. Some can be involved in bread making	Children may think that all bacteria are harmful. State to them that humans have bacteria inside them which help to digest food. Children may believe that all microorganisms can be seen with the eye. Clarify to them that a powerful microscope is needed to view them	What is a microorganism? Where can bacteria be found and what can they do? What diseases can viruses cause? What infections can fungi cause? How are some bacteria helpful for humans	organism – A living thing such as a plant, animal, bacteria or fungi. microorganisms – Tiny organisms such as bacteria, viruses and fungi. bacteria – Simple, tiny, invisible (to the eye) microorganisms. viruses – Tiny microorganisms that need a host. fungi – A group of organisms including mushrooms, mould and yeast
Session 6	**Classify Micro organisms** Microorganisms such as bacteria, viruses and fungi can be classified. The classification of microorganisms is based on their features or characteristics such as shape. Bacteria, viruses and fungi have different shapes	Clarify to children that microorganisms can be classified based on their features, just as animals and plants can. Children may struggle to create questions when classifying microorganisms. Create a whole-class question bank to help them to generate questions when constructing classification key	How can microorganisms be classified? What questions can be used to classify microorganisms? How are bacteria, viruses and fungi similar? How are bacteria, viruses and fungi different	classification – Method of arranging organisms into groups. bacteria viruses fungi classification key – A way of separating organisms into groups or types. Yes No microorganisms – Tiny organisms such as bacteria, viruses and fungi

Session 7	**Carl Linnaeus** Carl Linnaeus was a Swedish botanist who wrote a book called Systema Naturae or System of Nature. Linnaeus was famous for developing the first system to classify animals. The classification was based on a hierarchical system. Within the animalia kingdom, Linnaeus initially divided animals into six classes. These were mammals, birds, amphibians, fish, insects and worms	Children may think that Linnaeus created a classification system for microorganisms. Due to a lack of technology, Linnaeus was not aware of the existence of microorganisms. Children should be aware that Linnaeus did not classify reptiles as a separate vertebrate group.	Who was Carl Linnaeus? Why did Linnaeus create the classification system? How did Carl Linnaeus classify animals? What challenges did Linnaeus face? Why do you think Linnaeus did not classify microorganisms? How have advances in science allowed us to identify, group and classify microorganisms	Carl Linnaeus – A Swedish botanist who first developed a system to classify animals based on physical characteristics. classification – Method of arranging organisms into groups. Yes No characteristics – Features of an organism. vertebrate – Animal with a spine. invertebrate – Animal without a spine

Year 6 LESSON OVERVIEWS (Declarative & Procedural knowledge)

Curriculum links
Use recognised symbols when representing a simple circuit in a diagram.
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
Associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit.

Working scientifically (Procedural knowledge)
Recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs
Reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of and a degree of trust in results, in oral and written forms such as displays and other presentations.
Taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate

Year 6 – Electricity	Declarative (sticky) Knowledge	Possible misconceptions	Key Questions	Vocabulary
Session 1	**Construct and draw series circuits using symbols** A series circuit is where all the components are in one continuous loop. Components in a series circuit include the battery, buzzers, wires, bulbs and switches. Each component in a circuit has a symbol. Current is the flow of electricity in a circuit. Voltage causes the current to flow.	Children may draw pictorial representations of circuit components when drawing circuits rather than symbols. When drawing circuits, they may think that wires should be drawn as a “wiggly” line. State to children that wires should be drawn as straight lines using a pencil and a ruler.	What is a series circuit? What are circuit symbols? What is the symbol that represents a bulb/battery? What are the rules for drawing circuits and symbols? What is current? What is voltage? What would happen if the cells or batteries were removed from the series circuit? Why will this bulb not light up in this series circuit?	Series circuit – A circuit where all the components are in one single loop. Cell – A source of electrical power (voltage) Battery – A source of electrical power (voltage). A battery is more than one cell Bulb – A component in a circuit that produces light. Current – The flow of electricity in a circuit. Voltage – Causes the current to flow
Session 2	**Complete and incomplete circuits** For a circuit to be complete, all the components, including a battery, are connected by wires and the switch is closed. An incomplete circuit may have a break in the wires, a switch may be open or the battery is the wrong way in the holder. The current does not flow at all in an incomplete circuit.	Children may believe that when a circuit is incomplete, then the electricity or current disappears or “escapes” from the circuit. Explain that electricity or current does not flow at all in incomplete circuits and does not disappear or “escape”. Children may think that if all the components are in place, then the circuit is complete. Explain that even if all the components are in place, if the switch is open then the circuit is incomplete	What is a complete/incomplete circuit? Why does this circuit work? Give reasons. Why does this circuit not work? Give reasons. Why is it important to connect the wires properly in a circuit? What is the role of a switch in a circuit? What happens to the current in an incomplete circuit?	Complete circuit – Circuits that do not have breaks in them Incomplete circuit – Circuits that have breaks in them, such as an open switch. Switch – Allows current in a circuit to be turned on and off Buzzer – A component that makes a buzzing or beeping sound

Session 3	**Variation within circuits** The more components there are in a circuit, the dimmer the bulbs and the quieter the buzzers. The more components there are in a circuit, the more difficult it is for current to flow	As children construct their circuits, they may see that when there is just one bulb, it is brighter than when more are added. Adding more bulbs means that it is more difficult for the current to flow around the circuit. This is why the brightness of bulbs decreases when more are added		Series circuit – A circuit where all the components are in one single loop Battery – A source of power in a circuit Bulb – A component of a circuit that produces light Current – This is the flow of electricity in a circuit. Voltage – Causes the current to flow.
Session 4	**Plan – voltage experiment**	When planning the investigation, children may confuse the variables. Children should discuss the reliability of the results and how this can be determined, for example repeating the experiment and then comparing the new results to the previous results to see if there are any anomalies	How will the circuit be constructed? What materials and equipment are needed? Which variable will you change (the independent variable)? Which variable will you measure (the dependent variable)? Which variables will you keep the same (the controlled variables)?	independent variable (what will change) – The voltage, or the number of batteries dependent variables (what will be measured) – The brightness of the bulbs and the loudness of the buzzers. controlled variables (what is kept the same) – The type of batteries used and the number of components in the circuit.
Session 5	**Investigate – voltage experiment**	Explain when the children are completing their tables of results, that the independent variable is stated in the first column (on the left) and the dependent variable is stated in the second column (on the right). Remind children that when they are drawing their circuits, they need to use a pencil to draw the correct symbols and wires should be drawn as straight lines using a ruler.	What do you think will happen in the investigation and why? When you change the number of batteries, why is it important to keep the number of bulbs, buzzers and switches the same? How will the results from the investigation be recorded?	voltage – Causes the current to flow current – The flow of electricity in a circuit. repeatability – The likelihood of getting similar results if the experiment is carried out again.
Session 6	**Evaluate – voltage experiment**	Children may confuse “accuracy” and “repeatability”. Ensure they are confident with these terms stated in the key vocabulary section. • Children may state that they can improve their experiment by working with another person or group. Explain that this does not improve the experiment.	What was your prediction? How does increasing voltage or the number of batteries affect the brightness of a bulb or the loudness of a buzzer? Did your results match your prediction? Why/why not? How could the investigation be improved? What could be done differently to improve the results?	repeatability – The likelihood of getting similar results if the experiment is carried out again accuracy – How close a result is to the standard value. Accuracy can be improved by the quality of the equipment used evaluation – To consider the quality of the results obtained and suggest improvements to the investigation

Year 6 LESSON OVERVIEWS (Declarative & Procedural knowledge)

Working scientifically (Procedural knowledge)
– Identifying scientific evidence that has been used to support or refute ideas or arguments.
Reporting and presenting findings from enquiries in oral and written forms such as displays and other presentations.

Year 6 – Renewable energy	Declarative (sticky) Knowledge	Possible misconceptions	Key Questions	Vocabulary
Session 1	**What is renewable energy?** Solar power uses light energy from the Sun to generate electricity. Wind power uses wind to generate electricity. Solar and wind power are renewable energy sources. This means that they do not run out. Fossil fuels used to generate electricity are a non-renewable energy source. This means that fossil fuels will eventually run out.	Children may think there are no disadvantages to renewable energy sources. Highlight to children that there are some disadvantages of renewable energy sources, such as wind power being weather-dependent	What are fossil fuels? How are fossil fuels used to generate electricity? How does this damage the environment? What is solar and wind power? How can solar and wind power be used to generate electricity? What are the advantages of solar and wind power? What are the disadvantages of solar and wind power? What are the differences between renewable and non-renewable energy sources?	What are fossil fuels? How are fossil fuels used to generate electricity? How does this damage the environment? What is solar and wind power? How can solar and wind power be used to generate electricity? What are the advantages of solar and wind power? What are the disadvantages of solar and wind power? What are the differences between renewable and non-renewable energy sources?
Session 2	**Using renewable energy** In the UK, burning fossil fuels to generate electricity is the largest source of greenhouse gas emissions. Emissions of greenhouse gases lead to the greenhouse effect and global warming. Renewable energy sources, such as solar and wind energy, can help limit the impact of global warming	Children may think that renewable energy sources are always expensive. Explain that both wind and solar power technology has now advanced and these energy sources are cheaper than non-renewable energy sources. • Some children may think that wind turbines pose a risk to birds. Highlight to children that wind turbines are not normally lethal to birds and the aim is to minimise risk to wildlife	What are solar panels? What are wind turbines? How do solar panels work? How do wind turbines work? How do solar panels and wind turbines help the environment? What are the advantages/disadvantages of solar panels? What are the advantages/disadvantages of wind turbines?	solar panels – devices that absorb light from the Sun and convert it into electricity wind turbine – a machine which uses wind to generate electricity global warming – the gradual increase in the Earth's temperature greenhouse gases – gases that trap heat from the Sun and cause the Earth to warm up

Year 6 LESSON OVERVIEWS (Declarative & Procedural knowledge)

Curriculum links
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 that objects are seen because they give out or reflect light into the eye.

Working scientifically (Procedural knowledge)
Use relevant scientific language and illustrations to discuss, communicate and justify their scientific ideas (non-statutory).
Recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs
Planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary.
Taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate.

Year 6 – Light	Declarative (sticky) Knowledge	Possible misconceptions	Key Questions	Vocabulary
Session 1	**How we see** Luminous objects emit light and non-luminous objects do not emit light. Humans can see objects because a light source produces light. Light reflects from an object to the eye. Light passes through the pupil to the retina.	Some children may think that light is emitted from our eyes. Explain that objects can be seen when the light from the object enters our eyes. Children may initially believe that we can only see objects that emit light, such as the Sun or a light bulb. Explain that not all objects emit light themselves. Instead, we can see objects that reflect light into our eyes	What is a light source? What is a natural light source? What is an artificial light source? Is an example of a natural or artificial light source? How can we see objects that are not sources of light? What is the pupil/retina/lens/iris? What is its function? How can we see objects?	light source – object that produces light retina – the layer at the back of the eye that is sensitive to light. iris – the coloured part of the eye that controls the size of the pupil pupil – the black part of the eye that lets light into the eye lens – the part of the eye that focuses light onto the retina
Session 2	**Light and straight lines** Light travels in straight lines. Light travels from a light source to an object. The light rays reflect from the object to the eye. A reflection is where light rays bounce off an object	Children may not have experienced true darkness and therefore may think that we can see in the dark. Explain to children that if there is no light, then we cannot see anything.	Why do we need light to see objects? How does light travel? What does “reflection” mean? Can light pass through objects like walls or doors? Explain your thinking. Why do we see shadows when light is blocked by an object? How does light reach our eyes from a light source? How can humans see an object in a room? Why can we still see some things in a dark room at night?	light source – object that produces light reflection – when light bounces off an object ray diagram – a diagram that shows how light travels angle – where two lines meet at a point periscope – an instrument that uses mirrors to make objects visible around barriers

Session 3	**Shadow formation** Light travels in straight lines. When light rays from a light source travel to an opaque object, they cannot pass through and a shadow is formed. The blocked light rays create an area of darkness behind the object, which is the shadow. The shape of a shadow is determined by the shape of the object that blocks the light. Shadows are always dark because they are areas from which light has been blocked.	Children may think that shadows are always the same size. The shape and size of the shadow formed depend on the size of the object blocking the light and the angle of the light source	How does light travel? What does transparent/translucent/opaque mean? What is a shadow? What causes a shadow to form? Are there objects that don't create shadows? Why? Can shadows have different colours? Why/why not? How does the shape of an object affect the shape of its shadow?	shadow – a dark area caused by an object blocking a source of light opaque – an object or material that does not allow any light to pass through it translucent – an object or material that allows some light to pass through it transparent – an object or material that allows all light to pass through it solar eclipse – when the Moon passes between the Earth and the Sun and blocks the sunlight from reaching the Earth. This casts a shadow of the Moon on the Earth
Session 4	**Plan – shadow experiment**	Children may measure the length or width of a shadow that has been cast by another object. Care must be taken to ensure that the shadow is cast from the opaque object and not from other objects in the room. Children may need support converting between units, e.g. centimetres and millimetres.	What do you predict will happen? How will you set up your experiment? What distances are you choosing to use in your experiment? What are the independent, dependent and controlled variables? What equipment will you use? How will you record your results?	independent variable (what will change) – the distance between the light source and the opaque object dependent variable (what will be measured) – the size of the shadow on the wall controlled variable (what is kept the same) – the size of the opaque object and the distance from the object to the wall
Session 5	**Investigate – shadow experiment**	Children may choose an opaque object that is too large. State to them that the object should not be too large, as it will produce a very large shadow that is difficult to measure. Children may find it difficult to measure the size of the shadow. Care must be taken when measuring to ensure that the shadows from other light sources in the room are ignored.	What is your prediction? Why do you predict this will happen? Which variables will you control to make it a fair test? How will you prevent any other light sources in the room from affecting the investigation? What did you find out in the experiment	light source – object that produces light shadow – a dark area caused by an object blocking a source of light opaque – an object or material that does not allow any light to pass through it
Session 6	**Make conclusions – shadow experiment**	Children are encouraged to draw a line graph to show their findings from this investigation. They may need support with drawing an accurate line graph to plot data.	How does light travel? What was your prediction for this experiment? What conclusions can you make from your data? If you were to repeat this experiment, how could you improve your results? What questions do you have for further investigation?	light source – object that produces light shadow – a dark area caused by an object blocking a source of light opaque – an object or material that does not allow any light to pass through it conclusion – what has been found out during an investigation based on experimental measurements and observations evaluate – to consider the quality of the results obtained and suggest improvements to the investigation

Year 6 LESSON OVERVIEWS (Declarative & Procedural knowledge)

Curriculum links
Working scientifically (Procedural knowledge)
Identifying scientific evidence that has been used to support or refute ideas or arguments
Reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of and a degree of trust in results, in oral and written forms such as displays and other presentations

Year 6 – Light Pollution	Declarative (sticky) Knowledge	Possible misconceptions	Key Questions	Vocabulary
Session 1	**What is light pollution?**	Children may not realise that artificial light confuses the circadian rhythm (our 24-hour internal clock) in both animals and humans.	What is light pollution? What is glare/light trespass/skyglow?	migration – seasonal movement of animals from one place to another

	Glare, light trespass and skyglow are all types of light pollution. Glare is caused by brightness from car or vehicle headlights. Light trespass is where light shines into areas it is not intended to. Skyglow is the brightening of the sky at night.	Children may not realise how light pollution can impact them. For example, exposure to light before bedtime impacts heavily on the quality of sleep.	Why is it essential to use outdoor lights wisely? How can light pollution impact animals and their habitats? What are some examples of sources of light pollution in our school/homes? How does light pollution affect our ability to see stars at night? Why is it important to turn off unnecessary lights?	glare – a type of light pollution that is caused by brightness from car or vehicle headlights light trespass – a type of light pollution that is caused by light shining in areas it is not intended to go skyglow – the brightening of the sky at night light pollution – unwanted effects of artificial light
Session 2	**How can we reduce light pollution?** There are ways to reduce our light emissions. Turning off lights, devices, appliances and machines, unplugging electronic equipment and using natural light as much as possible helps to reduce light pollution	Children may think that light pollution is only an issue in cities, particularly if they live in a town or city and have less experience of rural environments or vice versa.	What is light pollution? Why is light pollution an issue? What changes can you make to your use of appliances/ devices to reduce light pollution? How can light pollution impact animals and their habitats? What are some examples of sources of light pollution in our school/homes?	urban – characteristic of a city/town rural – characteristic of a countryside environment light emission – light released or given out in the world appliance – a device or piece of equipment designed to perform a specific task light pollution – unwanted effects of artificial light

Year 6 LESSON OVERVIEWS (Declarative & Procedural knowledge)

Curriculum links –

Working scientifically (Procedural knowledge)

Year 6 – The Circulatory System	Declarative (sticky) Knowledge	Possible misconceptions	Key Questions	Vocabulary
Session 1	**The Circulatory System**			
Session 2	**The Heart**			
Session 3	**Blood flow in the hear**			
Session 4	**Oxygenated and deoxygenated blood**			
Session 5	**Blood**			
Session 6	**Dissection of the Heart**			

Year 6 LESSON OVERVIEWS (Declarative & Procedural knowledge)

Curriculum links
Working scientifically (Procedural knowledge)

Year 6 – Drugs, Diet and Lifestyle	Declarative (sticky) Knowledge	Possible misconceptions	Key Questions	Vocabulary
Session 1	**Diet**			

Session 2	**Drugs**			
Session 3	**Cigarettes**			
Session 4	**Plan – heart rate experiment**			
Session 5	**Investigate – heart rate experiment**			
Session 6	**Evaluate – heart rate experiment**			

Year 6 LESSON OVERVIEWS (Declarative & Procedural knowledge)

Curriculum links –

Working scientifically (Procedural knowledge)

Year 6 – Variation	**Declarative (sticky) Knowledge**	**Possible misconceptions**	**Key Questions**	**Vocabulary**
Session 1 **Enquiry Question -**	**Variation**			
Session 2 **Enquiry Question -**	**Characteristics**			

Year 6 LESSON OVERVIEWS (Declarative & Procedural knowledge)

Curriculum links –

Working scientifically (Procedural knowledge)

Year 6 – Adaptation	**Declarative (sticky) Knowledge**	**Possible misconceptions**	**Key Questions**	**Vocabulary**
Session 1 **Enquiry Question -**	**Animal Adaptations**			
Session 2 **Enquiry Question -**	**Plant Adaptations**			
Session 3 **Enquiry Question -**	**Evolution**			

Session 4 **Enquiry Question -**	**Charles Darwin**			
Session 5 **Enquiry Question -**	**Natural Selection**			
Session 6 **Enquiry Question -**	**Darwin's Finches**			
Session 7 **Enquiry Question -**	**How have plants and animals evolved over time to adapt to their environment?**			

Year 6 LESSON OVERVIEWS (Declarative & Procedural knowledge)

Curriculum links –

Working scientifically (Procedural knowledge)

Year 6 - Fossils	**Declarative (sticky) Knowledge**	**Possible misconceptions**	**Key Questions**	**Vocabulary**
Session 1 **Enquiry Question -**	**Fossil Formation**			
Session 2 **Enquiry Question -**	**Compare Fossils**			
Session 3 **Enquiry Question -**	**Explore Fossils (Mary Anning)**			