Bramcote Hills Primary School
'Make the future better for all'

Science

Curriculum Depth Map

Table of Contents

Bramcote Hills Primary School
'Make the future better for all'

Curriculum Depth Map – Science

Aims

The national curriculum for science aims to ensure that all pupils:

- develop scientific knowledge and conceptual understanding through the specific disciplines of biology, chemistry and physics.
- develop understanding of the nature, processes and methods of science through different types of science enquiries that help them to answer scientific questions about the world around them.
- are equipped with the scientific knowledge required to understand the uses and implications of science, today and for the future.

Intent

At BHPS, we provide children with a challenging and engaging science curriculum, which goes above and beyond the requirements of the National Curriculum outlined above. We aim to foster a healthy curiosity about our universe, enabling children to understand how the world has developed and can be explained through the disciplines of physics, chemistry and biology. Children will acquire a growing body of conceptual knowledge which should be retained. In addition, we aim to develop their procedural knowledge by teaching them to work scientifically.

Throughout their study, the children will acquire and develop the conceptual and procedural knowledge that has been identified within each unit and across each year group. Conceptual knowledge is taught in sequences that builds on prior learning. Working scientifically is a golden thread that runs throughout the units and is, itself, carefully sequenced and matched, wherever possible, to the appropriate conceptual knowledge. We ensure that the procedural knowledge that enables them to work scientifically is taught and not just experienced.

Conceptual Knowledge

Referred to as scientific knowledge and conceptual understanding in the National Curriculum, this is knowledge of products of science: concepts, laws, theories and models.

In our Science Curriculum Depth Map, the progression of knowledge is taught in the context of Key Primary Themes and shows how it builds over time to develop pupils' understanding in Biology, Chemistry and Physics

Pupils will build their conceptual knowledge base by:

- Knowing more facts
- Giving further examples of the same concept
- Understand and use a wider range of vocabulary.
- Use models or concepts to describe their knowledge and understanding.
- Make and explain links across areas of science.

Over time, that knowledge will become organised and connected. Constant recall will help pupils to activate prior knowledge and encourage them to make connections between units.

Procedural Knowledge

Working scientifically specifies the understanding of the nature, processes and methods of science for each year group and is covered alongside each concept, never in isolation. Our curriculum specifies what procedural knowledge underpins working scientifically.

The National Curriculum states that working scientifically should be 'embedded within the content of biology, chemistry and physics' incorporating a range of scientific enquiries that look at the nature, processes and methods of science.

These types of procedural knowledge should include: observing over time; pattern seeking; identifying, classifying and grouping; comparative and fair testing (controlled investigations); and researching using secondary sources.

Our Curriculum Depth Map aims to familiarise pupils with all these types of disciplinary knowledge so that by the end of Key stage 2 they are able to choose the most suitable enquiry type to answer questions.

Key Primary Themes have been identified to enable children to contextualise, link and understand conceptual knowledge. Pupils should be able to apply their knowledge of science when using equipment, conducting experiments, building arguments and explaining Key Primary Themes confidently whilst continuing to ask questions and be curious about the world around them.

Pupils are also taught about the contributions that scientists have made and continue to make, to the world they live in.

Implementation

We motivate and enthuse pupils by creating deep links with other curriculum areas including maths, science, history, art and SMSC. Wherever possible, we use first-hand experiences and aim to provide a purposeful, engaging high-quality science education that provides pupils with the foundations for understanding the world. Much of science lends itself to outdoor learning and so we provide pupils with opportunities to experience this. Through various workshops, trips and interactions with experts, children have the understanding that science has changed our lives and that it is vital to the world's future prosperity.

Our science curriculum is designed to allow children time to think, discuss, practise, explore and embed. This allows time for teaching, practice and repetition – both in a year group and across key stages. Curriculum coverage is sequenced carefully from EYFS to Year 6 which allows key primary themes, conceptual (substantive knowledge – *knowing that*) and procedural (disciplinary knowledge – *knowing how)* knowledge to be developed and revisited at a deeper level of learning.

Lessons will be planned and a knowledge organiser provided for pupils, which outlines the area to be taught, how new knowledge and skills fit in with prior learning, 'sticky' knowledge they need to understand and key vocabulary they need to learn. As we draw our pupils from a wide catchment, we are mindful that some of our children come from a scientific background (we have children whose parents have links with Nottingham University and the Queens Medical Centre) and already have some understanding of the specific disciplines of biology, chemistry and physics. These children are encouraged to study key primary themes in more depth and through supporting others, explaining their thinking and linking ideas rationally. Children who do not have this cultural capital are supported by the knowledge organisers and the revisiting of key knowledge.

Lessons seek to introduce new knowledge and concepts in small, logical steps, in line with cognitive load theory. Children's knowledge will be built up gradually, making links, wherever possible, to previous knowledge and other areas of learning. We seek to further children's ability to commit new learning to long term memory by assessing their retention and revisiting key knowledge. Potential misconceptions will be addressed through carefully selected lesson content and effective feedback.

Procedural knowledge will be taught and not just 'experienced' by carrying out practical work.

Maths and science naturally complement each other. Science generates data that can be collected, analysed and presented in various ways. When working scientifically, children are expected to search for patterns in the results they collect and to interpret evidence and draw conclusions. This provides lots of opportunities to use mathematical knowledge and skills in science lessons. By integrating maths with science, it is possible to take away some of the abstract nature of maths and make it more relevant and meaningful.

Impact

The impact of our science teaching can be constantly monitored through both formative and summative assessment opportunities, such as low-stakes tests/quizzes, rapid recall opportunities, varied activities. Opportunities for children to communicate using scientific vocabulary will also form part of the assessment process in each unit. Teaching Assessments in Primary Science (TAPS) is a focused Assessment approach embeds assessment within classroom primary science activities. The TAPS activity plans provide guidance for using the Focused Assessment approach to support progression in science skills. Pupil outcomes from each focused activity can be used formatively to consider next steps for the class or individual, and/or summatively to inform summaries for the next class teacher or for parents.

Pupils should leave BHPS equipped with the requisite skills and knowledge to succeed in key stage 3 science. They will have the necessary tools to confidently and meaningfully question and explore the world around them as well as critically and analytically experiencing and observing phenomena. Pupils will understand the significance and impact of science on society.

The expected impact of our science curriculum is that children will:

- Develop a body of foundational knowledge in Biology, Chemistry and Physic Component of Learning s, as outlined in the National Curriculum.
- Be able to explain and remember the key (sticky) knowledge, using scientific vocabulary, during and at the end of each unit of study. This could be evidence by work in books, low stakes assessment activities or through pupil conversations.
- Identify and use equipment effectively to accurately gather, measure and record data.
- Be able to display and convey data in a variety of ways, including graphs.
- Analyse data in order to identify, classify, group, and find patterns.
- Use evidence to formulate explanations and conclusions.
- Demonstrate scientific literacy through presenting concepts and communicating ideas using scientific vocabulary.
- Understand the importance of resilience and a growth mindset, particularly in reference to scientific enquiry.
- Meet the end of key stage expectations outlined in the National curriculum for science.
- Have high aspirations, which will see them through to further study, work and a successful adult life, particularly girls.
- Have a genuine love of science and a thirst for scientific knowledge.

During the following Staging Points these will be identified as:

Foundation

The principal focus of science teaching in Foundation is to foster curiosity about the world around them.

- Know about similarities and differences in relation to places, objects, materials and living things.
- Talk about the features of their own immediate environment and how environments might vary from one another.
- Make observations of animals and plants.
- Explain why some things occur and talk about changes.

Opportunities for scientific development are provided through adult-focused activities as well as in the classroom continuous provision.

KS1

The principal focus of science teaching in KS1 to enable pupils to experience and observe phenomena, looking more closely at the natural and humanly constructed world around them.

- Be able to explain the sticky knowledge from a unit, using scientific vocabulary and giving real life examples.
- Be curious and ask questions about what they notice.
- Develop their understanding of scientific ideas, using different types of scientific enquiry to answer their own questions.
- Observe changes over a period of time, noticing patterns.
- Group and classify things for a purpose.
- Carry out simple comparative tests.
- Further develop their knowledge using secondary sources of information.
- Use scientific language to talk about what they have found out and communicate their ideas to a range of audiences and in a variety of ways.
- Name a famous scientist.

LKS2 - Years 3 & 4

The principal focus of science teaching in LKS2 is to enable pupils to broaden their scientific view of the world around them.

- Be able to explain the sticky knowledge from a unit, using scientific vocabulary and giving real life examples.
- Explore, talk about, test and develop ideas about everyday phenomena and the relationships between living things and familiar environments.
- Begin to develop their ideas about functions, relationships and interactions.
- Ask questions about what they observe.
- Make decisions about which types of scientific enquiry are likely to be the best ways of answering questions.
- Observe changes over time, notice patterns, group and classify things.
- Carry out simple comparative and fair tests.
- Draw simple conclusions.
- Name a famous scientist and explain why they are significant.

UKS2 - Years 5 & 6

The principal focus of science teaching in UKS2 is to enable pupils to develop a deeper understanding of a wide range of scientific ideas.

- Be able to explain the sticky knowledge from a unit, using scientific vocabulary and giving real life examples.
- Interpret a set of data (raw data, diagram or graph) relating to the units studied, explaining why certain phenomena take place.
- Describe how an experiment can be set up to prove a concept.
- Record data accurately.
- Present findings and make conclusions.
- Pose a question about an area studied to which they would like an answer.
- Talk about how our understanding of an area of science studied has changed over time.
- Give an account of a famous scientist and their contributions to society/the world.

KS3

The principal focus of science teaching in KS3 is to develop a deeper understanding of a range of scientific ideas in the subject disciplines of biology, chemistry and physics.

- Begin to see the connections between these subject areas and become aware of some of the big ideas underpinning scientific knowledge and understanding.
- Relate scientific explanations to phenomena in the world around them.
- Use modelling and abstract ideas to develop and evaluate explanations.
- Understand that science is about working objectively, modifying explanations to take account of new evidence and ideas.
- Decide on the appropriate type of scientific enquiry to undertake to answer their own questions.
- Develop a deeper understanding of factors to be taken into account when collecting, recording and processing data.
- Evaluate results and identify further questions arising from them.

The Foundations for Learning Science in the Early Years

The foundations for learning science begin in the early year's classroom. At BHPS, our curriculum aligns the EYFS area 'Understanding the World' with the Science National Curriculum. In Foundation, children experience a combination of direct teaching and child led exploration to achieve an understanding of scientific concepts. Children's interests and curiosities are equally valued and fostered and therefore we have included a continuous provision element to summarise the potential learning that may arise within the environment.

Our EYFS curriculum ensures sufficient coverage of Key Primary Themes including plants, animals, environments, everyday materials and seasonal changes. The sticky knowledge is explicitly taught and then embedded through pedagogical approaches appropriate for EYFS including exploration, observation and investigation. Our Foundation unit is a vocabulary rich environment where adults enhance children's scientific language through a purposeful play-based approach.

Our Foundation curriculum teaches 'The Characteristics of Effective Learning' in a sequential and progressive approach. Our school views this disciplinary knowledge as an important prerequisite to the 'Working Scientifically' strand. Teachers are integral to organising children's scientific learning, explicitly teaching the connections between components of knowledge, and therefore avoiding misconceptions.

Learning is carefully sequenced, considering the small steps children need to achieve the ELG and considers the interplay between conceptual and procedural knowledge that children need in order to access the National Curriculum. KS1 staff draw upon the Understanding of the World ELG assessment to support future teaching. The ELG assesses only a small proportion of the learning children experience. As KS1 teachers begin Component of Learning s, they teach and assess initial knowledge that children may have acquired previously.

Foundation	Autumn Term		Spring Term		Summer Term	
	1	**2**	**1**	**2**	**1**	**2**
Component of Learning Title	I wonder… what makes us special and what I can do?	I wonder… where the story will take us?	I wonder…. what's out there?		I wonder….how living things grow?	
Links to Science Key Primary Theme	**Senses**	**Seasonal Changes - Autumn**	**Earth and Space**	**Healthy me -Jigsaw**	**Animals including humans (Changing Me – Jigsaw)**	**Living things and their habitats**
Sticky knowledge	• Know that my senses help me see, hear, feel, small and taste need exercise to help keep my body healthy. • Moving and resting are good for my body. • Washing my hands is a way of keeping my body healthy. • Physical features of humans include hair, skin colour, eye colour. These make us unique. • Parts of the body linked to senses and main parts of the body. • Humans grow from babies to adults.	• The weather changes in each of the seasons. • Winter is the coldest season and summer is the hottest season. • Leaves change colour and fall from the trees during Autumn. **Everyday Materials** • Plastic and wood are materials. • Different materials are used to make different things. • A material is what something is made from • Paper can be recycled. Some materials cannot be recycled.	• Know that we live on planet earth. • Know that there are other planets. • Planet Earth has a moon • The sun is a star • People who travel to space are called astronauts	• Some foods are healthy and some are not. Vegetables are healthy because they give you vitamins. You shouldn't eat too many sugary foods e.g. sweets. • Sleep is good for my body. Know that cleaning your teeth is good oral hygiene.	Some animals live in the wild, some can be kept as pets. • Animals such as a Poison Dart Frog, two toed sloth and a caiman live in some rain forests. • Chickens have a beak, two legs, feathers, wings. • Animals all have a life cycle e.g. chicks grow into chickens. • Animals, including humans grow and change over time	• Some minibeasts live in woodland. • Some minibeasts live in a meadow. • Most plants need sunlight and water to grow. • Trees have different features such as their leaves. We can use these to identify them. • Plants have roots. • Plants are living things. • Some plants have flowers, but some do not.

Link to KS1 Key Primary Themes	Y1 – Animals including humans. Y2 – Conditions for Living		Y1 – Seasonal Changes	Y1/Y2- Everyday Materials		Y1/Y2 Healthy Me (Jigsaw PHSE) Y2 – Conditions for living	Y1 – Classification of animals Y2 – Habitats, plants		Y1/Y2 Changing Me (Jigsaw PHSE)
Explore and learn in continuous provision	• Explore different senses. • Tell you what I can see, hear and feel when I am outside. • Explore different weather and materials. • Explore how the wind can move objects. • Explore how objects move in water. • Listen to sounds outside and identify the source.			• Tell you any changes I notice outside in comparison to autumn. • Explore how materials can be changed e.g. ice, choc, butter. • Observe, measure and record how materials change when heated and cooled. • Explore a range of materials, including natural and human-made materials. • Make objects from different materials, including natural materials. • Explore how craters are formed. • Learn about space travel.			• Explore plants and animals in the natural environment. • Compare different environments eg. The woodland and the school grounds. • Explore different habitats including revisiting rainforests.		
Working scientifically	• Use senses and observe closely. • Can talk about the things observed in the environment. • Solve problems by trying many different ideas. • Respond to new experiences • Watch and replicate how others do things. • Repeat activities.			• Notice similarities and differences. • Use skills they have been taught within their play • Use a trial and error approach • Think of their own ideas • Plan how they will explore or play • Solve problems using some given solutions – considering the most appropriate idea • Make independent choices of materials • Concentrate on achieving something that's important to them			• Draw and discuss different things observed. • Learn how to take care of other living things • Question things that happen • Use equipment and tools carefully • Solve problems by independently thinking and trying solutions • Correct their mistakes themselves • Make connections in their learning • Think of their own explanations		
Vocabulary	**Tier 1**	**Tier 2**	**Tier 3**	**Tier 1**	**Tier 2**	**Tier 3**	**Tier 1**	**Tier 2**	**Tier 3**
	change baby grown up same different winter summer	weather		plastic wood	space moon rocket planet healthy exercise	crater astronaut meteor orbit telescope	animals eggs peck	life cycle minibeasts insects extinct antennae recycle	hatch hatchling egg tooth coop

Science Curriculum Depth Map – Progression of knowledge by Key Primary Themes

Biology						
F2	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Year 6**
Animals Including Humans						
Healthy Me	**Classification of animals**	**Conditions for living**	**Conditions for living**	**Conditions for living**	**Human/Animal change**	**Essential Organs**
Know and talk about the different factors that support overall health and wellbeing,	Identify and name a variety of common fish, amphibians, reptiles, birds, mammals.	Understand that animals, including humans, have offspring, which grow into adults - introduced to the processes of reproduction and growth in animals – focused on growth, rather than how reproduction occurs.	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.	Explore what damages teeth and how can we / animals look after them	Describe the changes as humans develop to old age.	Describe the ways in which nutrients and water are transported in animals including humans.
Know the importance of oral hygiene	Identify and name a variety of carnivores, herbivores and omnivores	Find out about and describe the basic needs of animals, including humans, for survival (water, food, air).	Identifying and comparing animals without skeletons and observing their movement.	Compare the teeth or carnivores and herbivores and suggest reasons for differences.	Draw a timeline to indicate the stages in the growth and development of humans, including puberty.	Recognise the impact of diet, exercise, drugs and lifestyle on the way their body's function.
Know how to describe what they see, hear and feel	Describe and compare the structure of common animals (fish, amphibians, reptiles, birds and mammals, including pets) by how they look and how they move	Describe the importance for humans of exercise.	Identify that humans and some other animals have skeletons and muscles for support, protection and movement – research how different parts of the body have special functions.	Identify and name the parts of the human digestive system and explore questions to understand their special functions.	Research the gestation periods of other animals and compare them to humans – recording length and mass of baby as it grows.	Identify and name the parts of the human circulatory system and describe the functions of the heart, blood vessels and blood.
Know, observe and discuss the changes that occur in the life cycle of an animal	Identify, name, draw and label the basic parts of the human body (head, neck, arms, elbows, legs, knees, face, ears, eyes, hair, mouth, teeth) through games, actions, songs and rhymes.	Describe the importance for humans of eating the right amounts of different types of food – nutrition	Compare and contrast the different diets of animals, as well as different food groups.	Identify and know the different types of human teeth and know the simple functions of different human teeth.		Describe how to keep bodies healthy and how they can become damaged – including how some use of drugs and other substances can be harmful.
	Say which part of the body is associated with the five senses, using them to compare different textures, sounds and smells.	Describe the importance for humans of hygiene.		Use and construct food chains to identify producers, predators and prey.		
	Describe how to take care of animals in their local environment and the need to return them safely after study.					
	Compare and contrast animals, describing how they could group them (i.e., what they eat)					

Biology						
F2	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Year 6**
Living Things and their Habitats						
Minibeasts		**Habitats**		**Food Chains /Interdependency Habitat change**	**Animal and plant change**	**Classification**
Know and describe similarities and differences in relation to living things		Explore and compae the differences between things that are living, dead and things that have never been alive		Recognise that living things (animals, flowering plants, non-flowering plants) can be grouped in different ways.	Know the life cycle of different living things e.g., mammal, amphibian, insect and bird and compare their life cycles.	Give reasons for classifying plants and animals in a specific way.
Know and describe the habitat of familiar woodland animals		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		Explore and use classification keys to help group, identify and name living things in their local and wider environment and begin to group vertebrates and invertebrates.	Know the process of reproduction in plants and in animals, including sexual and asexual reproduction in plants and sexual reproduction in animals.	Classify living things into broad groups according to observable characteristics and based on similarities and differences including micro-organisms, plants and animals.
Know and describe patterns and changes in nature		Identify and name different plants and animals in their habitats, including micro habitats		Recognise that environments can change and that this can sometimes pose dangers to living things, including the human impact on them (positive and negative)	Throughout the year, observe the local environment and life cycle changes in a variety of living things.	Broad groupings like microorganisms, animals and plants can be subdivided.
Know how human actions impact on the environment		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.		Study the local environment throughout the year to observe plants and animals in their local habitat – how does it change throughout the year?	Research the work of naturalists and animal behaviourists like David Attenborough and Jane Goodall.	Give reasons why living things are classified in one group and not another.
		Identify that all living things have certain characteristics that are essential for keeping them alive and healthy.			Investigate how plants can grow (seeds, stems, root cuttings, tubers, bulbs).	Research about the significant work of Carl Linnaeus.
		Observe how living things in the local habitat depend on one another as a source of food and shelter.				
		Compare animals in familiar habitats with animals found in less familiar habitats.				

Biology						
F2	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Year 6**
Plants						Evolution and Inheritance
How things grow	**Conditions for growth (relating to plant structure)**	**Conditions for growth**	**Conditions for growth Conditions for reproduction**			**Evolution, Inheritance and Adaptation**
Know how to care for a plant, including water and light	Identify and name a variety of common wild and garden plants including deciduous and evergreen trees	Observe and describe how seeds and bulbs grow into mature plants in the local environment throughout the year.	Know the function of different parts of flowering plants and trees.			Know how the Earth and living things have changed over time and how fossils can be used to find out about the past.
	Identify and describe the basic structure of common flowering plants (blossom, roots, stem, leaves, flowers, petals, bulb, seed)	Describe how plants need water, light and the right temperature to grow and stay healthy – seeds and bulbs need water to grow but most do not need light.	Explore the requirements of plants for life and growth and how they vary from plant to plant (air, light, water, nutrients from the soil, and room to grow).			Know about reproduction and offspring (recognising that offspring normally vary and are not identical to their parents – characteristics are passed on from parents).
	Identify and describe the structure of trees (leaves, blossom, branches, trunk, fruit, roots, seed)	Begin to understand the requirements of plants for germination, growth and survival, as well as the processes of reproduction and growth in plants.	Investigate the way in which water is transported in plants.			Know how animals and plants are adapted to suit their environment in different ways and that adaption may lead to evolution. – giraffe's necks have become longer.
	Observe the growth of flowers, plants and/or vegetables over the course of the year.		Explore the part that flowers play in the life cycle of flowering plants including pollination, seed formation, and seed dispersal.			Consider how different breeds of dogs have evolved, including when different breeds produce offspring.
	Compare and contrast familiar plants, describing how they would identify and group them.		Explore the role of the roots and stem in the plant's nutrition and support, leaves for nutrition and flowers for reproduction.			Research the work of Charles Darwin and Alfred Wallace's work on evolution and link back to the work of Mary Anning.
	Recording the life cycles of plants and how plants change throughout the year.		Know that plants can make their own food – do not need to understand how it happens.			

Chemistry						
F2	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Year 6**
Everyday Materials	**Everyday Materials**	**Everyday Materials**	**Rocks**	**States of Matter**	**Properties and Changes of materials**	
Properties of Materials	**Properties of Materials**	**Properties of Materials**	**Properties of Rocks**	**Behaviour of Matter**	**Behaviour of Materials**	
Know the differences between simple materials and the changes they notice	Distinguish between an object and the material from which it is made	Identify and compare the suitability of a variety of everyday materials for particular uses	Compare and group rocks based on their appearance and physical properties, giving reasons. Look at local examples.	Compare and group materials together according to whether they are solids, liquids or gases.	Compare and group materials based on their properties (e.g., hardness, solubility, transparency, conductivity, and response to magnets (linked to years 3&4).	
Know the name of the everyday materials; wood, metal, glass, plastic	Identify and name a variety of everyday materials	Find out how shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching.	Know how fossils are formed when things that have lived are trapped within rock – links made to Mary Anning.	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.	Know and explain how a material dissolves to form a solution and know and show how to recover a substance from a solution.	
Know some materials can change, (e.g. ice in the water tray, baking; combing ingredients etc)	Describe the simple physical properties of a variety of everyday materials with opportunities to explore and ask questions of the materials and properties	Research inventors that have developed useful new materials, like, John Dunlop, Charles Macintosh, John McAdam or Elon Musk.	Know how soil is made with rocks and organic matter.	Identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature.	Know and demonstrate how some materials can be separated	
	Compare & group together a variety of everyday materials on the basis of their simple properties	Develop their understanding of sustainable / unsustainable materials for particular purposes.	Compare and contrast different types of soils.	Develop descriptions of the states of matter (solids hold their shape, liquids form pools, gases escape from unsealed containers).	Give reasons based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic.	
			Investigate what happens when rocks are left in water / rubbed together.	Observe water as a solid, liquid and a gas, describing the differences when it is cooled or heated.	Know and demonstrate that some changes are reversible and some are irreversible.	
					Know how some changes result in the formation of a new material and that this is usually irreversible including changes associated with burning and the action of acid on bicarbonate of soda.	
					Research how chemists create new materials, for example, Spencer Silver and Ruth Benerito.	

Physics						
F2	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Year 6**
Seasonal changes	**Seasonal changes**			**Sound**	**Earth and Space**	
Seasonal changes	**Seasonal changes**			**Sound behaviour**	**Earth as part of the Solar System**	
Know the name of the four seasons	Observe and describe weather associated with the seasons and how the day length varies, taught over the course of the year.			Know how sound is made, associating some of them with vibrating – explore and identify how sound is made in a range of musical instruments.	Know about and explain the movement of the Earth and other planets relative to the Sun.	
	Observe changes across the four seasons (taught over the course of the year).			Recognise that vibrations from sounds travel through a medium to the ear.	Know about and explain the movement of the Moon relative to the Earth.	
				Know the correlation between pitch and the object producing a sound and how it can be changed.	Describe the Sun, Earth and Moon (using the term spherical).	
				Know the correlation between the volume of a sound and the strength of the vibrations that produced it.	Know and demonstrate how night and day are created, and the apparent movement of the Sun across the sky.	
				Know what happens to a sound as it travels away from its source	Understand that the sun is a star and it has eight planets, while a moon is a celestial body that orbits a planet.	
					Research how ideas about the solar system have changed over time, understanding how the geocentric model of the solar system gave way to the heliocentric model given the work of Ptolemy, Alhazen and Copernicus.	

Physics – Electricity						
F2	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Year 6**
				Electricity		**Electricity**
				Sources of Power		**Manipulating Sources of Power**
				Identify and name appliances that require electricity to function.		Know how the number and voltage of cells in a circuit links to the brightness of a lamp or the volume of a buzzer
				Construct a series circuit and identify and name the components in a simple circuit (including cells, wires, bulbs, switches and buzzers) to create a simple device.		Compare and give reasons for why components work and do not work in a circuit e.g., brightness of bulbs, volume of buzzers, and on/off positions of switches.
				Predict and test whether a lamp will light within a circuit.		Draw circuit diagrams using correct symbols
				Know the function of a switch and link this to a simple series circuit.		Systematically identify the effect of changing one component at a time in a circuit.
				Know the difference between a conductor and an insulator; giving examples of each.		Create series circuit to create a useful tool, such as a traffic light, burglar alarm, etc.
				Draw a circuit as a pictorial representation – not necessarily using conventional circuit symbols.		
				Taught about the precautions for working safely with electricity.		
				Observe patterns and trends when creating simple series circuits.		

Physics - Forces						
F2	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Year 6**
			Forces and Magnets		**Forces**	
			Magnetism		**Friction/Gravity**	
			Know about and describe how objects move on different surfaces.		Explore falling objects and raise questions about the effects of air resistance.	
			Know how some forces require contact and some do not, giving examples.		Observe how different objects like parachutes and sycamore seeds fall.	
			Know about and explain how magnets attract and repel.		Identify and know the effect of air and water resistance on an object.	
			Predict whether magnets will attract or repel and give a reason.		Explore the effects of friction on movement and investigate how it slows or stops objects.	
			Compare and order everyday materials on the basis of whether they are attracted to a magnet or not.		Explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object.	
			Describe how magnets have two poles and explore the behaviour and everyday uses of different types of magnets.		Explain how levers, pulleys and gears allow a smaller force to have a greater effect	
					Describe how Galileo and Isaac Newton helped develop the theory of gravitation.	

Physics - Light						
F2	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Year 6**
			Light			**Light**
			Light Source			**Behaviour of light**
			Explore what happens when light reflects off a mirror or other reflective surface.			Recognise that light appears to travel in straight lines and 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.
			Know that dark is the absence of light and that light is needed in order to see and is reflected from a surface.			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.
			Know about the danger of direct sunlight / bright lights and describe how to keep protected.			Use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them.
			Recognise that shadows are formed when the light from a light source is blocked by an opaque object. Find patterns in the way that shadows change.			Investigate the phenomena such as rainbows, colours on soap bubbles and objects looking bent in water (refraction)

<table>
<tr><th colspan="4">Working Scientifically</th></tr>
<tr><th>EYFS</th><th>Year 1 & Year 2</th><th>Year 3 & Year 4</th><th>Year 5 & Year 6</th></tr>
<tr><td>Use my senses and observe closely.</td><td>Can ask simple questions and recognise that they can be answered in different ways</td><td>Ask relevant questions and using different types of scientific enquiries to answer them</td><td rowspan="2">Plan different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary</td></tr>
<tr><td>Can talk about the things observed in the environment.</td><td>Observe closely using simple equipment.</td><td>Set up simple practical enquiries, comparative and fair tests</td></tr>
<tr><td>Solve problems by trying many different ideas.</td><td>Perform simple tests.</td><td rowspan="3">Make systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers</td><td>Take measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate</td></tr>
<tr><td>Respond to new experiences</td><td>Identify and classify.</td><td rowspan="3">Record data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs</td></tr>
<tr><td>Watch and replicate how others do things.</td><td rowspan="2">Gather and record data to help in answering questions, noticing patterns and relationships</td></tr>
<tr><td>Repeat activities.</td><td>Gather, record, classify and present data in a variety of ways to help in answering questions</td></tr>
<tr><td>Notice similarities and differences.</td><td rowspan="2">Use observations and ideas to suggest answers to questions including using simple secondary sources (internet, books, visitors).</td><td rowspan="3">Record findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables</td><td rowspan="2">Use test results to make predictions to set up further comparative and fair tests</td></tr>
<tr><td>Use skills taught within play.</td></tr>
<tr><td>Use a trial-and-error approach.</td><td rowspan="4">Can begin to use simple scientific language when saying what they have done and what they have found out when suggesting answers to questions [with help].</td><td rowspan="2">Identify scientific evidence that has been used to support or refute ideas or arguments</td></tr>
<tr><td>Think of their own ideas</td></tr>
<tr><td>Plan how they will explore or play</td><td rowspan="2">Report on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions</td><td rowspan="14">Report and present 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</td></tr>
<tr><td>Solve problems using some given solutions – considering the most appropriate idea</td></tr>
<tr><td>Make independent choices of materials</td><td rowspan="13"></td><td rowspan="2">Identify differences, similarities or changes related to simple scientific ideas and processes</td></tr>
<tr><td>Concentrate on achieving something that’s important to them</td></tr>
<tr><td>Draw and discuss different things observed.</td><td rowspan="2">Use straightforward scientific evidence to answer questions or to support their findings.</td></tr>
<tr><td>Learn how to take care of other living things</td></tr>
<tr><td>Question things that happen</td><td rowspan="3">Use results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions</td></tr>
<tr><td>Use equipment and tools carefully</td></tr>
<tr><td>Solve problems by independently thinking and trying solutions</td></tr>
<tr><td>Correct their mistakes themselves</td></tr>
<tr><td>Make connections in their learning</td></tr>
<tr><td>Think of their own explanations</td></tr>
</table>

Conceptual Knowledge Overview

	Biology				Chemistry			Physics					
	Animals including humans	Evolution & Inheritance	Living Things and their habitats	Plants	Materials and their properties	Rocks	States of Matter	Earth & Space	Electricity	Forces & Magnets	Light	Seasonal Changes	Sound
EYFS	√		√					√				√	
1	√			√	√							√	
2	√		√	√	√								
3	√			√		√				√	√		
4	√		√				√		√				√
5	√		√		√		√	√		√			
6	√	√	√						√		√		

Half Termly Component of Learning Overview per year group

	Autumn Term		Spring Term		Summer Term	
	1	2	1	2	1	2
Foundation	Senses	Seasons	Earth and space	Everyday Materials	Living things and their habitats	Animals including humans
Year 1	Seasonal changes	Everyday materials	Seasonal changes	Animals including humans	Plants	Seasonal changes
Year 2	Everyday materials		Plants	Animals including humans	Living things and their habitats	
Year 3	Rocks	Light	Forces and Magnets		Plants	Animals including humans
Year 4	States of Matter	Electricity	Animals including humans		Living things and their habitats	Sound
Year 5	Living things and their habitats	Earth and Space	Properties and changes of materials	Forces	Animals including humans	
Year 6		Light	Animals including humans	Evolution and Inheritance	Living things and their habitats	Electricity

Science – Key Primary Themes

	YR	Unit	Key Primary Themes	Detail
Biology	Y1	Animals including humans	Classification of animals	Animals can be described and compared in a variety of ways. The human body has basic body parts.
	Y2	Animals including humans	Conditions for living	Humans need exercise, good hygiene and a balanced diet to stay healthy.
	Y3	Animals including humans	Conditions for living	Muscles and skeletons Animals and humans eat for nutrition. Balanced nutrition helps the bones and muscles grow.
	Y4	Animals including humans	Conditions for living	Teeth are an important part of digestion. Animals and humans absorb nutrients through digestion.
	Y5	Animals including humans	Human and Animal change	Animals and humans go through developmental stages within their lives
	Y6	Animals including humans	Essential Organs	The functions of the skeleton and the circulatory system
	Y6	Evolution and inheritance	Evolution, Inheritance and Adaptation	Animals have **adapted** to suit their environment. Adaptation may lead to **evolution**
	Y6	Living things and their habitats	Classification	Classification is a system called taxonomy, which is used to organise organisms based on physical similarities, characteristics, and evolutionary relationships.
	Y2	Living things and their habitats	Habitats	Animals are suited to their habitats, usually to maintain their position in their food chain.
	Y4	Living things and their habitats	Food Chains/Interdependency Habitat change	A food chain shows how food energy moves through an ecosystem. Environmental changes are affecting animals, their habitats and food chains.
	Y5	Living things and their habitats	Animal and plant change	Animals can be grouped according to whether they lay eggs undergo metamorphosis and how they produce
	Y1	Plants	Conditions for growth (relating to plant structure)	All plants share a basic structure to support their growth
	Y2	Plants	Conditions for growth	Plants need the correct conditions to grow
	Y3	Plants	Conditions for growth Conditions for reproduction	Plants are living systems with components to help them survive and reproduce.
Chemistry	Y1	Everyday materials	Properties of materials	Materials have different properties
	Y2	Everyday materials:	Properties of materials	Materials have different properties which affect what they can be used for
	Y5	Properties and changes of materials	Behaviour of materials	Materials have properties. Materials can be changed and can behave in different ways.
	Y3	Rocks	Properties of rocks	Rocks can be classified according to their properties
	Y4	States of Matter	Behaviour of matter	The three main states of matter are solid, liquid, and gas. A substance can change its state as a result of heating and cooling.
Physics	Y5	Earth and space	Earth as part of the solar system	Earth's relationship with the moon, sun and other planets
	Y4	Electricity	Sources of power	Electricity is a form of energy that can give things the ability to move and work
	Y6	Electricity	Manipulating sources of power	Electricity is a form of energy that can give things the ability to move and work.
	Y3	Forces and Magnets	Magnetism	The force exerted by magnets when they attract or repel each other
	Y5	Forces	Friction / Gravity	All objects have forces acting upon them.
	Y3	Light	Light source	A light source is an object that produces light these can be natural or artificial
	Y6	Light	Behaviour of light	Light travels in straight lines. It travels from the light source to an object and then reflects to our eyes.
	Y1	Seasonal changes	Seasonal change	In the UK we have four seasons within a year and these are associated with changes in the weather and length of daylight.
	Y4	Sound	Sound behaviour	Sound is made up of vibrations, or sound waves, that we can hear.

Tier 1	Tier 2	Tier 3
Basic vocabulary *To be used but require little or no explicit instruction.*	***Academic vocabulary*** *To be taught and assessed. Words that could be used across disciplines.*	**Context Specific** *Specific vocab that will normally relate to one subject – to be taught and assessed*

Science	Foundation		
Key Knowledge	**Key Vocabulary**		
Component of Learning – I wonder… what makes us special and what I can do?	**Tier 1**	**Tier 2**	**Tier 3**
Links to Science Key Primary Theme - Component of Learning: Senses Materials have different properties.	baby grown up same different	healthy exercise	
Link to KS1Key Primary Themes Y1 – Animals including humans. Y2 – Conditions for Living			
Sticky knowledge: taught & assessed for end goal. ❑ I need exercise to help keep my body healthy. ❑ Moving and resting are good for my body. ❑ Washing my hands is a way of keeping my body healthy. ❑ Physical features of humans include hair, skin colour, eye colour. These make us unique.			
Explore and learn in continuous provision. ❑ Explore different senses. ❑ Tell you what I can see, hear and feel when I am outside. ❑ Explore different weather and materials. ❑ Explore how the wind can move objects. ❑ Explore how objects move in water. ❑ Listen to sounds outside and identify the source.			
Working Scientifically ❑ Use senses and observe closely. ❑ Can talk about the things observed in the environment. ❑ Solve problems by trying many different ideas. ❑ Respond to new experiences. ❑ Watch and replicate how others do things. ❑ Repeat activities.			

Component of Learning – I wonder… where the story will take us?	**Tier 1**	**Tier 2**	**Tier 3**
Links to Science Key Primary Theme - Component of Learning: Seasonal Changes – Autumn Seasonal changes are linked to the weather and the amount of daylight	change same different winter summer	weather	
Link to KS1Key Primary Themes Y1 – Seasonal Changes			
Sticky knowledge: taught & assessed for end goal. ❑ The weather changes in each of the seasons. ❑ Winter is the coldest season and summer is the hottest season. ❑ Leaves change colour and fall from the trees during Autumn			
Explore and learn in continuous provision ❑ Explore different senses. ❑ Tell you what I can see, hear and feel when I am outside. ❑ Explore different weather and materials. ❑ Explore how the wind can move objects. ❑ Explore how objects move in water. ❑ Listen to sounds outside and identify the source.			
Working Scientifically ❑ Use senses and observe closely. ❑ Can talk about the things observed in the environment. ❑ Solve problems by trying many different ideas. ❑ Respond to new experiences ❑ Watch and replicate how others do things. ❑ Repeat activities.			

Component of Learning – I wonder… what's out there?	**Tier 1**	**Tier 2**	**Tier 3**
Links to Science Key Primary Theme - Component of Learning Earth and Space Earth's relationship with the moon, sun and other planets		space moon rocket planet	crater astronaut meteor orbit telescope binoculars
Link to KS1Key Primary Themes No KS1 Key Primary Theme links – revisited in Y5			
Sticky knowledge: taught & assessed for end goal. ❑ Know that we live on planet earth. ❑ Know that there are other planets.			
Explore and learn in continuous provision ❑ Tell you any changes I notice outside in comparison to autumn. ❑ Explore how materials can be changed e.g. ice, choc, butter. ❑ Observe, measure and record how materials change when heated and cooled. ❑ Explore a range of materials, including natural and human-made materials. ❑ Make objects from different materials, including natural materials. ❑ Explore how craters are formed. ❑ Learn about space travel.			
Working Scientifically ❑ Notice similarities and differences. ❑ Use skills they have been taught within their play ❑ Use a trial and error approach ❑ Think of their own ideas ❑ Plan how they will explore or play ❑ Solve problems using some given solutions – considering the most appropriate idea ❑ Make independent choices of materials			

Component of Learning – I wonder… what's out there?	**Tier 1**	**Tier 2**	**Tier 3**
Links to Science Key Primary Theme - Component of Learning: Everyday Materials Materials have different properties which affect what they can be used for	plastic wood	recycle	
Link to KS1Key Primary Themes Y1/2 Everyday Materials			
Sticky knowledge: taught & assessed for end goal. ❑ Plastic and wood are materials. ❑ We use different materials to make different things. Building blocks are usually made from wood but Duplo is made from plastic. ❑ A material is what something is made from. ❑ Paper can be recycled. Some materials cannot be recycled.			
Explore and learn in continuous provision ❑ Tell you any changes I notice outside in comparison to autumn. ❑ Explore how materials can be changed e.g. ice, choc, butter. ❑ Observe, measure and record how materials change when heated and cooled. ❑ Explore a range of materials, including natural and human-made materials. ❑ Make objects from different materials, including natural materials. ❑ Explore how craters are formed. ❑ Learn about space travel.			
Working Scientifically ❑ Notice similarities and differences. ❑ Use skills they have been taught within their play ❑ Use a trial-and-error approach ❑ Think of their own ideas ❑ Plan how they will explore or play ❑ Solve problems using some given solutions – considering the most appropriate idea ❑ Make independent choices of materials			

Component of Learning – I wonder….how living things grow?	**Tier 1**	**Tier 2**	**Tier 3**
Links to Science Key Primary Theme - Component of Learning Living things and their habitats Animals are suited to their habitats, usually to maintain their position in their food chain	animals	life cycle minibeasts insects	
Link to KS1Key Primary Themes Y1 – Classification of animals Y2 – Habitats			
Sticky knowledge: taught & assessed for end goal. ❑ Some minibeasts live in woodland. ❑ Some minibeasts live in a meadow. ❑ Most plants need sunlight and water to grow. ❑ Trees have different features such as their leaves. We can use these to identify them. ❑ Plants have roots. ❑ Plants are living things. ❑ Some plants have flowers but some do not.			
Explore and learn in continuous provision ❑ Explore plants and animals in the natural environment. ❑ Compare different environments eg. The woodland and the school grounds. ❑ Explore different habitats including revisiting rainforests.			
Working Scientifically ❑ Draw and discuss different things observed. ❑ Learn how to take care of other living things ❑ Question things that happen ❑ Use equipment and tools carefully ❑ Solve problems by independently thinking and trying solutions ❑ Correct their mistakes themselves ❑ Make connections in their learning ❑ Think of their own explanations			

Component of Learning – Healthy Me – Jigsaw PHSE	**Tier 1**	**Tier 2**	**Tier 3**
Links to Science Key Primary Theme - Component of Learning: Conditions for Living Animals and humans go through developmental stages within their lives			
Link to KS1Key Primary Themes Y1/Y2 Healthy Me (Jigsaw PHSE) Y2 – Conditions for living			
Sticky knowledge: taught & assessed for end goal. ❑ Some foods are healthy and some are not. Vegetables are healthy because they give you vitamins. You shouldn't eat too many sugary foods e.g. sweets. ❑ Parts of the body include head, shoulders, knees and toes. ❑ Sleep is good for my body. Know that cleaning your teeth is good oral hygiene			
Explore and learn in continuous provision ❑ Tell you any changes I notice outside in comparison to autumn. ❑ Explore how materials can be changed e.g. ice, choc, butter. ❑ Observe, measure and record how materials change when heated and cooled. ❑ Explore a range of materials, including natural and human-made materials. ❑ Make objects from different materials, including natural materials. ❑ Explore how craters are formed. ❑ Learn about space travel.			
Working Scientifically ❑ Notice similarities and differences. ❑ Use skills they have been taught within their play ❑ Use a trial and error approach ❑ Think of their own ideas ❑ Plan how they will explore or play ❑ Solve problems using some given solutions – considering the most appropriate idea ❑ Make independent choices of materials			

Component of Learning – Animals including humans /Changing Me (Jigsaw PHSE)	Tier 1	Tier 2	Tier 3
Links to Science Key Primary Theme - Component of Learning: Animals including humans Animals and humans go through developmental stages within their lives	animals eggs peck	life cycle extinct	hatch hatchling egg tooth coop
Link to KS1Key Primary Themes Y1/Y2 - Changing Me (Jigsaw PHSE))			
❑ Some animals live in the wild, some can be kept as pets. ❑ Dinosaurs are extinct. ❑ Animals such as a Poison Dart Frog, two toed sloth and a Tapir live in some rain forests. ❑ Chickens have a beak, two legs, feathers, wings. ❑ Animals all have a life cycle e.g. chicks grow into chickens. ❑ Humans grow from babies to adults.			
Explore and learn in continuous provision ❑ Explore plants and animals in the natural environment. ❑ Explore different habitats including revisiting rainforests.			
Working Scientifically ❑ Draw and discuss different things observed. ❑ Learn how to take care of other living things ❑ Question things that happen ❑ Use equipment and tools carefully ❑ Solve problems by independently thinking and trying solutions ❑ Correct their mistakes themselves ❑ Make connections in their learning ❑ Think of their own explanations			

Tier 1	Tier 2	Tier 3
Basic vocabulary *To be used but require little or no explicit instruction.*	***Academic vocabulary*** *To be taught and assessed. Words that could be used across disciplines.*	**Context Specific** *Specific vocab that will normally relate to one subject – to be taught and assessed*

Science – KS1

Year 1

Key Knowledge

Component of Learning Everyday Materials

Key Primary Theme: Properties of materials
Materials have different properties.

Initial knowledge

- ❑ Distinguish between the name of an object and the material it is made from.
- ❑ Hard things are not easily broken or bent.
- ❑ Soft things are easy to cut, fold or change the shape of.
- ❑ Stretchy things can be pulled longer or wider without breaking.
- ❑ Rough things feel uneven and bumpy.
- ❑ Smooth things have no lumps or bumps.

Sticky knowledge: taught & assessed for end goal.

- ❑ Materials are what an object is made from.
- ❑ Shiny things reflect light.
- ❑ Dull things do not look shiny.
- ❑ Waterproof things keep water out.
- ❑ Absorbent things soak up water.
- ❑ You can see through some objects and not others (Aspirational Vocab: Transparent and Opaque)

Working Scientifically

- ❑ Know how to **test** the different properties of a material.
- ❑ **Compare** materials.
- ❑ Name some scientific **equipment** we might need when testing materials such as a pipette and a beaker.
- ❑ **Classify materials** firstly by material, and then by their properties.
- ❑ **Use scientific vocabulary** to describe their findings.

Key Vocabulary

Tier 1	Tier 2	Tier 3
bendy	absorbent	
brick	dull	
elastic	fabric	
foil	material	
glass	opaque	
hard	properties	
metal	rough	
paper	transparent	
plastic	waterproof	
rock		
shiny		
smooth		
soft		
stiff		
stretchy		
water		
wood		

Component of Learning Animals including humans

Key Primary Theme: Classification of animals
Animals can be described and compared in a variety of ways.
The human body has basic body parts.

Initial knowledge

- ❑ Some animals live in the wild, some can be kept as pets.
- ❑ Fish live and breathe under water. They have scaly skin and fins to help them swim.
- ❑ All birds have a beak, two legs, feathers, wings. Some birds do not fly.

Sticky knowledge to be taught and assessed for end goal.

- ❑ Humans have five senses and there are basic body parts associated with each one – sight (eye), hearing (ears), touch (skin), taste (tongue) and smell (nose).
- ❑ Animals that mostly eat other animals (meat) are carnivores (tiger, sharks, eagle, crocodile).
- ❑ Animals that only eat plants are herbivores (giraffe, rabbit, tortoise, snail).
- ❑ Animals that eat both plants and other animals are omnivores (crabs, mallard, honey badger, worm).
- ❑ Fish breathe through gills.
- ❑ Mammals are animals that breathe air, grow hair or fur and feed on their mother's milk as a baby.
- ❑ All reptiles have scales on their skin and are cold blooded.
- ❑ Amphibians live in the water as babies and on land as they grow older. They have smooth, slimy skin.

Working Scientifically

- ❑ Use a hand lens to **observe** closely.
- ❑ Use **equipment** such as a pooter to collect minibeasts, understanding how to handle and return them safely.
- ❑ Can **classify** an animal using a classification tree.
- ❑ Use **secondary sources** to find out information.
- ❑ Explore our local area and **answer questions** about animals in their habitats **using simple scientific language**.
- ❑ **Compare** different textures, sounds and smells using their senses.

Tier 1	Tier 2	Tier 3
fish	amphibians	
birds	reptiles	
pets	mammals	
wild	carnivores	
pet	herbivores	
hearing	omnivores	
sight	human	
touch		
taste		
skin		
tongue		
neck		
elbows		
knees		

Component of Learning Plants	Tier 1	Tier 2	Tier 3
Key Primary Theme: Conditions for growth (relating to plant structure) All plants share a basic structure to support their growth. ***Initial knowledge*** ❑ Some plants grow in the wild (daisy, dandelion, nettle) and some are planted in gardens and parks (rose, sunflower, daffodil). ❑ Flowers attract insects and birds. ❑ Petals are the colourful part of the flower. ❑ Fruit contains the plant's seeds. ❑ Seeds and bulbs grow into new plants. ***Sticky knowledge to be taught and assessed for end goal.*** ❑ Deciduous trees have broad, flat leaves which fall off in winter. ❑ Evergreen trees have hard leaves or needles that stay on the trees all year. ❑ Roots take in water and nutrients from the soil. ❑ The stem holds the plant up and carries the water and nutrients from the roots to the leaves and flowers. ❑ Leaves catch sunlight to make energy. ***Working Scientifically*** ❑ With support, **plan** a comparative test, comparing the roots of two different plants. ❑ **Set up and perform** a comparative test to show how roots take in water. ❑ With support, **predict** what will happen. ❑ Begin to **measure** the growth of plants using standard units. ❑ **Gather data** to **answer a simple question**. ❑ With support, begin to draw **conclusions** based on their findings. ❑ **Draw a diagram** to show the different parts of a plant.	branch bud bulb flower fruit garden plant leaf petal seed wild plant	deciduous evergreen nutrients root stem trunk Ash Beech Fir Oak Pine Silver birch Sycamore Willow	

Component of Learning Seasonal changes *(taught throughout the year)*	Tier 1	Tier 2	Tier 3
Key Primary Theme: Seasonal change In the UK we have four seasons within a year and these are associated with changes in the weather and length of daylight. ***Initial knowledge*** ❑ The weather changes in each of the seasons. ❑ Summer is the hottest season and winter the coldest. ***Sticky knowledge to be taught and assessed for end goal.*** ❑ In the UK we have four seasons: spring, summer, autumn and winter. ❑ Seasons change throughout the year because of the way the Earth travels around the Sun. ❑ In summer the days are longer and in winter they are shorter. ***Working Scientifically*** ❑ **Observe and record** the weather using a **chart**. ❑ **Gather data** about weather in other places **(from a secondary source).** ❑ Understand that a weather forecast is a **prediction** of the weather. ❑ State whether the predictions from the weather forecast were **accurate.** ❑ Deliver a weather **report** based on **observations**. ❑ Make a rain gauge to **collect data** on rainfall. ❑ Use a thermometer to **measure** the temperature.	hot/warm cool/cold sun/sunny cloud/cloudy wind/windy rain/rainy snow/snowing hail/hailing sleet frost fog/mist ice/icy rainbow thunder lightning storm light/dark day/night	season spring summer autumn winter weather temperature thermometer	

Tier 1	Tier 2	Tier 3
Basic vocabulary *To be used but require little or no explicit instruction.*	***Academic vocabulary*** *To be taught and assessed. Words that could be used across disciplines.*	**Context Specific** *Specific vocab that will normally relate to one subject – to be taught and assessed*

Science – KS1	Year 2		
Key Knowledge	**Key Vocabulary**		
Component of Learning Uses of Everyday Materials	**Tier 1**	**Tier 2**	**Tier 3**
Key Primary Theme: Properties of Materials Materials have different properties which affect what they can be used for. ***Initial knowledge*** ❑ Wood is hard, stiff and strong. ❑ Glass is a material that can be made in many shapes. It is hard, waterproof and transparent material. It is often used to make windows and bottles. ❑ Plastic is used to make many of the things used in everyday life. ❑ Paper is light and flexible, but cardboard is strong and stiff. ***Sticky knowledge to be taught and assessed for end goal.*** ❑ Materials are chosen for objects because they have certain properties. ❑ Materials can be used for more than one thing and different materials can be used for the same thing. ❑ Wood is opaque. It can be carved into different shapes. ❑ Plastic is waterproof and strong. It can be made rough or smooth, flexible or rigid and can be made into different colours. ❑ Rock is a natural material. It is strong, hard and often used for building. ❑ Paper and cardboard are made from trees or by recycling. ❑ The shapes of some solid objects made from certain materials can be changed by squashing, bending, twisting and stretching. ***Working Scientifically*** ❑ **Test** the different properties of a material. ❑ **Compare** materials. ❑ **Classify materials** in different ways (according to their properties and/or their use) ❑ **Use scientific vocabulary** to describe their findings. ❑ Write a simple **report** using **scientific vocabulary.**	clay fabric natural recycling rock rough rubber strong waterproof	bending flexible human made opaque rigid squashing stretching transparent twisting	

Component of Learning Plants	**Tier 1**	**Tier 2**	**Tier 3**
Key Primary Theme: Conditions for Growth Plants need the correct conditions to grow. ***Initial knowledge*** ❑ Most plants need light from the sun to grow well. ❑ If they are given the right conditions, seeds and bulbs grow into mature plants. ❑ Seeds and bulbs need water to germinate. ***Sticky knowledge to be taught and assessed for end goal.*** ❑ Seeds and bulbs have a store of food inside them. ❑ Germination is when a seed starts to grow. ❑ Germination can be triggered by moisture and warmth. ❑ Plants make their own food in their leaves using sunlight. ❑ Some plants like cooler temperatures and some like warmer temperatures. ❑ A food chain shows how animals depend on other plants and animals for their food and survival. ***Working Scientifically*** ❑ **Plan** a comparative test. ❑ **Set up and perform a test.** ❑ **Ask questions** drawing on prior knowledge (from Yr. 1). ❑ **Make observations** of the growth of different plants (from primary and secondary sources). ❑ Draw **conclusions** to answer questions. ❑ **Measure** the growth of a plant using a ruler. ❑ **Measure** the amount of water a plant is given using a measuring cylinder.	bulbs grow healthy life cycle light seeds suitable temperature supplies water	conditions grassland mature nutrition polar seed dispersal shoot sprout	germination photosynthesis

Component of Learning Animals, including humans	Tier 1	Tier 2	Tier 3
Key Primary Theme **Conditions for living:** Humans need exercise, good hygiene and a balanced diet to stay healthy. ***Initial knowledge*** ❑ All animals, including humans, need food, water and air to stay alive. ❑ To stop illness and infections spreading, we must be hygienic and keep ourselves clean. ❑ Keep your mouth healthy by brushing your teeth for two minutes twice a day. ❑ It is important not to eat too much sugar and fat. ***Sticky knowledge to be taught and assessed for end goal.*** ❑ All animals, including humans, have offspring which grow into adults. For example, egg-caterpillar-pupa-butterfly. ❑ It is important to have 30-60 minutes of exercise every day. ❑ All foods contain nutrients which your body needs to stay active throughout the day. ❑ Sugary foods are bad for your teeth and can be fattening, and foods with lots of fat are bad for year heart. ❑ Everyone should have their '5 a day'–5 portions of fruit and vegetables, to get the right amount of nutrients. ***Working Scientifically*** ❑ Make **observations** of the changes of a butterfly. ❑ Use **secondary sources (internet and books) to gather data/information.** ❑ **Ask questions.** ❑ **Suggest answers to questions.** ❑ **Suggest ways to answer their questions.** ❑ Use a measuring tape to **measure** height**.**	adults air develop food grow survival water	diet exercise fat germs healthy hygiene infection lifecycle nutrition offspring	carbohydrate dairy protein vitamin

Component of Learning Living things and their habitats	Tier 1	Tier 2	Tier 3
Key Primary Theme **Habitats** Animals are suited to their habitats, usually to maintain their position in their food chain. ***Initial knowledge*** ❑ Some things are living, somethings are dead and some things have never been alive. ***Sticky knowledge to be taught and assessed for end goal.*** ❑ All living things move, respire (breathe), sense, grow, reproduce, excrete and feed (nutrition) (MRS GREN) ❑ A habitat is a place that an animal lives. It provides the animal with food, water and shelter. ❑ There are many different sorts of habitats and micro-habitats around the world from forests to grasslands and from mountain slopes to deserts. ❑ Most living things are suited to living in a habitat e.g., camels have long lashes to keep out sand. ❑ A food chain shows how each animal gets its food. Food chains are one of the ways that animals depend on each other to stay alive. ❑ In a food chain, there are some living things that produce energy (producers) and some that use the energy (consumers). ***Working Scientifically*** ❑ **Classify and group** animals in different ways. ❑ **Notice patterns and relationships** between animals, their habitats and their needs for survival. ❑ **Use secondary sources (books) to answer questions.** ❑ **Construct a food chain.**	dead desert living ocean polar ponds rainforest rivers sea seashore senses shelter woodland	conditions food chain nutrition habitat excretion reproduce	respiration species microhabitat

Tier 1	Tier 2	Tier 3
Basic vocabulary *To be used but require little or no explicit instruction.*	***Academic vocabulary*** *To be taught and assessed. Words that could be used across disciplines.*	**Context Specific** *Specific vocab that will normally relate to one subject – to be taught and assessed*

Science – KS2	Year 3		
Key Knowledge	**Key Vocabulary**		
Component of Learning Animals including humans	**Tier 1**	**Tier 2**	**Tier 3**
Key Primary Theme: **Conditions of living** Muscles and skeletons Animals and humans eat for nutrition. Balanced nutrition helps the bones and muscles grow.	carbohydrates contract diet fat heart lungs nutrition protein vitamins	cartilage fibre joint minerals muscles pelvis rib cage ribs skeleton skull spine tendon	invertebrates brain
Initial knowledge ❑ Humans and animals have different diets. We use the words carnivore, herbivore and omnivore to compare these. ❑ A healthy meal will have a balance of carbohydrates, proteins and vegetables.			
Sticky knowledge to be taught & assessed for end goal. ❑ Humans cannot make their own food in the same way that plants do (relate to leaves making food for a plant). They get their nutrition from what they eat. ❑ Humans have skeletons and muscles for support, protection and movement. ❑ Humans and some animals have a skull, spine, ribs and joints. ❑ Some animals do have a spine and some do not (invertebrates; crabs, spiders, butterflies).			
Working Scientifically ❑ Carry out **research using secondary sources** (e.g., visitor, books). ❑ **Present findings using written explanations** and include diagrams when needed. ❑ **Draw diagrams** and label them using **scientific vocabulary.** ❑ Talk about the criteria for **grouping, sorting and classifying.** ❑ Use simple **classification keys.**			

Component of Learning Light	**Tier 1**	**Tier 2**	**Tier 3**
Key Primary Theme **Light Source** A light source is an object that produces light, these can be natural or artificial.	candle dark lamp light Moon natural orbits star Sun surface torch	artificial light source opaque reflection shadows translucent transparent	periscope
Initial knowledge ❑ Some objects like glass are transparent which means that light can shine through them. ❑ Our main source of light on Earth comes from the Sun. ❑ Darkness is made by blocking light from the sun or some other source of light, which makes shadows.			
Sticky knowledge to be taught and assessed for end goal. ❑ The Sun, other stars, fires, torches and lamps all make their own light and so are examples of sources of light. ❑ A mirror is not a source of light, it reflects light. ❑ Moving an object closer or further away from the light source will change the size of its shadow. ❑ A light source is an object that produces light. ❑ We see light sources because light travels from them into our eyes. ❑ We see can see non-light sources because light from a light source reflects off them and travels into our eyes. ❑ The light from the sun can damage our eyes and our skin. We can prevent some of this damage by using sunglasses, sunscreen, clothing and shade.			
Working Scientifically ❑ **Ask relevant questions**. ❑ **Observe** at what time of day a shadow is likely to be at its longest and shortest. ❑ Be prepared to **change ideas** as a result of what has been found out during a scientific enquiry. ❑ **Handle equipment** with care and know how to store it (mirrors, torches).			

Component of Learning Rocks	Tier 1	Tier 2	Tier 3
Key Primary Theme **Properties of rocks** Rocks can be classified according to their properties ***Initial knowledge*** ❑ There are different types of rocks. ❑ Humans have used rocks for millions of years, from early tools and weapons through to construction materials for modern buildings. ❑ Different types of rock suit different purposes ***Sticky knowledge to be taught and assessed for end goal.*** ❑ Rocks are formed in different ways. ❑ Sediment deposited over time, often as layers at the bottom of lakes and oceans, forms sedimentary rocks. ❑ Extreme pressure and heat over time forms metamorphic rocks. Examples are marble and slate. ❑ When magma cools and solidifies it forms igneous rock. Examples are granite and pumice. ❑ It is possible to group together different types of rocks on the basis of their appearance and simple physical properties e.g., smoothness/texture, solidity, strength, porosity, colour, appearance and, for depth, in context of their origin. ❑ Soils are made from rocks and organic matter. ❑ Fossils are formed when things that have lived are trapped within rock ***Working Scientifically*** ❑ **Ask questions** such as: Where does a fossil come from? ❑ **Use secondary sources (books and internet)** to find out what the main differences are between sedimentary and igneous rocks. ❑ **Report findings** using oral explanations e.g., within a presentation.	iron steel soil texture	crystals sedimentary metamorphic igneous organic matter fossil porous	

Component of Learning Plants	Tier 1	Tier 2	Tier 3
Key Primary Theme: **Conditions for growth** **Conditions for reproduction** Plants are living systems with components to help them survive and reproduce. ***Initial knowledge*** ❑ Trees provide shelter and food for wildlife. ❑ Parts of a plant include roots, tuber, stem, bulb, trunk, branch, leaf, flower and fruit. Not all plants have the same features. ❑ Some plants, but not all, are flowering plants. ***Sticky knowledge to be taught and assessed for end goal.*** ❑ Trees absorb carbon dioxide and produce breathable air. ❑ Photosynthesis is the process whereby plants use the energy in sunlight to convert water from the soil and carbon dioxide from the atmosphere into simple sugars for use as food by the plant. ❑ For a flowering plant to reproduce, pollen needs to move to the ovary of another flower. ❑ Flowering plants reproduce through pollination. ❑ Pollination is when pollen travels from the stamen of one flower to the stigma of another. ❑ In insect pollination (animal dispersal), pollen sticks to an insect in one flower and rubs off in another. ❑ Seed dispersal is the transport of seeds from the plant to another area to grow. This can be through animals, wind or water dispersal ***Working Scientifically*** ❑ **Investigate** our local area and **record** the plants that grow here. ❑ **Investigate** different seed types, therefore different methods of seed dispersal (in the local area) ❑ **Decide what data to collect** and the best way to **report** this (bar charts/other statistical tables (in line with Year 3 mathematics statistics). ❑ **Draw conclusions.**	air flowers leaves light nutrients nutrition roots soil stem trunk water	animal dispersal fertiliser reproduce seed formation seed dispersal	photosynthesis pollination

Component of Learning Forces and Magnets	Tier 1	Tier 2	Tier 3
Key Primary Theme: **Magnetism:** The force exerted by magnets when they attract or repel each other	push pull metal surface	magnetic pole attract repel force magnet magnetic north south	
Initial knowledge: ❑ Forces can be seen as pushes or pulls. ❑ There are different uses for magnets. ❑ Objects will move when affected by a push or a pull and will keep moving unless affected by other forces.			
Sticky knowledge to be taught and assessed for end goal. ❑ Objects move differently on different surfaces. ❑ Some forces need contact between two objects but magnetic forces can act at a distance (e.g., opening a door, pushing a swing) ❑ Some materials are magnetic (affected by a magnet) and some are not. ❑ Everyday materials are grouped according to whether they are attracted to a magnet. ❑ Magnets have two poles (north and south) ❑ Magnets will attract or repel each other, depending on which poles are facing.			
Working Scientifically ❑ **Observe** how magnets attract or repel each other. ❑ Group or **classify** different objects according to how they move. ❑ **Test** how things move on different surfaces. ❑ **Investigate** the behaviour of different magnets e.g., bar, ring, button, horseshoe. ❑ **Test** the strengths of different magnets in a fair way. ❑ **Predict** which materials are magnetic. ❑ **Draw conclusions** explaining findings			

Tier 1	Tier 2	Tier 3
Basic vocabulary *To be used but require little or no explicit instruction.*	***Academic vocabulary*** *To be taught and assessed. Words that could be used across disciplines.*	**Context Specific** *Specific vocab that will normally relate to one subject – to be taught and assessed*

Science – KS2	Year 4		
Key Knowledge	**Key Vocabulary**		
Component of Learning Animals including humans	**Tier 1**	**Tier 2**	**Tier 3**
Key Primary Theme: **Conditions for living** Teeth are an important part of digestion. Animals and humans absorb nutrients through digestion.	mouth stomach	canine deciduous/milk teeth digestion incisor large intestine molar oesophagus small intestine	
Initial knowledge ❑ We should visit a dentist every 6 months. ❑ All organisms need food to survive.			
Sticky knowledge to be taught & assessed for end goal. ❑ The eight incisors are sharp and flat to cut food. ❑ The four canine teeth are pointed and rip food. ❑ Molars and premolars are bumpy and grind food. ❑ The process of absorbing nutrients from food is called digestion. ❑ The major parts of the human digestive system include the mouth, oesophagus, stomach, small intestine, and large intestine (colon).			
Working Scientifically ❑ **Ask relevant questions** using scientific vocabulary. ❑ Recognise that **secondary sources** might help to research questions that cannot be answered through practical investigation.			

Component of Learning Living things and their habitats	**Tier 1**	**Tier 2**	**Tier 3**
Key Primary Theme **Food Chains** A food chain shows how food energy moves through an ecosystem. **Habitat Change** Environmental changes are affecting animals, their habitats and food chains.	classification food chain food web	consumers ecosystem environment(al) habitat human impact predator prey producers primary consumer secondary consumer	Deforestation organisms
Initial knowledge ❑ Living things can be classified (grouped) in different ways according to their characteristics.			
Sticky knowledge to be taught and assessed for end goal. ***Food Chains*** ❑ A food chain shows how food energy moves through an ecosystem. ❑ A food web can show more complex food relationships than a food chain. ❑ The arrows in a food chain mean 'is eaten by', not 'eats'. ❑ A food chain has a producer, prey and predators. ❑ Plants are producers and create their own food using sunlight via photosynthesis. ❑ Nutrients produced by plants move to primary consumers then to secondary consumers through food chains. ❑ Animals are consumers and must eat other organisms.			
Habitat Change ❑ Environments can change and this can sometimes pose dangers to living things. ❑ Environmental change affects habitats differently. ❑ An ecosystem is a group of organisms in one place which depend on each other to survive. ❑ Different organisms are affected differently by environmental change. ❑ Human activity significantly affects the environment.			
Working Scientifically ❑ Ask **questions** and use scientific **enquiry** to answer them. ❑ Create oral and written **explanations**, considering the audience. ❑ **Record** an example of a food chain. ❑ **Identify and group** animals according to their habitat			

Component of Learning Electricity	Tier 1	Tier 2	Tier 3
Key Primary Theme **Sources of Power** Electricity is a form of energy that can give things the ability to move and work. ***Initial knowledge*** ❑ A source of electricity (mains or battery) is needed for electrical appliances to work. ***Sticky knowledge to be taught and assessed for end goal.*** ❑ Electricity is a type of energy that can build up in one place to flow to another. ❑ Electricity can be generated by power stations, wind, the sun, water and other sources. ❑ Electricity sources push electricity around a circuit. ❑ A circuit must be complete for electricity to flow and devices to work; switches can be used to control this flow. ❑ Some materials allow electricity to flow easily and these are called conductors (metals are good conductors). ❑ Materials that do not allow electricity to flow easily are called insulators. ***Working Scientifically*** ❑ **Observe patterns** (bulbs get brighter if more cells are added). ❑ **Plan and carry out a fair test.** ❑ Understand the importance of controlling variables. ❑ Manage **scientific equipment safely** and responsibly (blubs, batteries, bulb holders, crocodile clips, wires). ❑ Make **predictions** using plausible reasons. ❑ Able to **amend predictions** according to findings. ❑ **Present** findings using written explanations and include labelled **diagrams**, when needed.	danger (dis)connect. electrical electricity flow metal plastic plug power rubber switch wire socket	appliance battery bulb buzzer cells circuit component conductor insulator mains motor negative positive rechargeable solar symbol	

Component of Learning Sound	Tier 1	Tier 2	Tier 3
Key Primary Theme: **Sound behaviour** Sound is made up of vibrations, or sound waves, that we can hear. ***Initial knowledge*** ❑ Sounds are caused by a material vibrating. ❑ Sounds can be a high or low pitch. ***Sticky knowledge to be taught and assessed for end goal.*** ❑ Sounds travel in all directions from a source, including above and below, round corners and through materials. ❑ Sounds travel more easily through a solid than through a liquid or a gas because the particles in a solid are packed more closely together so it is easier for the vibration to be passed on. ❑ The loudness of a sound is dependent on how strong the vibrations are. The size of these vibrations is known as the amplitude. ❑ Sounds become fainter as you move away from the sound source as the vibrations pass through the air away from the sound source they become weaker. ❑ Sound is a form of energy that transfers in a longitudinal wave. ❑ Our ear drums vibrate in a similar way to the original source of the vibration, allowing us to hear many different sounds**.** ***Working Scientifically*** ❑ Set up a fair test, changing only one variable at a time. ❑ Gather and **record** information using a chart, matrix or tally chart, depending on what is most suitable. ❑ Write up findings using a **plan, do and evaluate** process. ❑ Understand that repeating a test will increase the reliability of results.	fainter high pitch inner ear instrument liquid loud low pitch middle ear outer ear quiet solid sound sound source travel vibrate vibrations volume	amplitude auditory frequency insulation particles longitudinal wave	cochlea

Component of Learning States of matter	Tier 1	Tier 2	Tier 3
Key Primary Theme **Behaviour of matter** The three main states of matter are solid, liquid, and gas. A substance can change its state as a result of heating and cooling. ***Initial knowledge*** ❑ Materials can be grouped into solids, liquids and gases. ❑ Water can naturally exist in three forms on Earth: liquid (water), solid (ice) or gas (water vapour). ***Sticky knowledge to be taught and assessed for end goal.*** ❑ Solid particles are packed together and do not move so that they can keep structure. ❑ Solids retain their shape unless a force is applied to them, for example to cut or shape them. ❑ Liquid particles remain grouped together but move. ❑ Liquids take the shape of the bottom of the container they are in but do not change in volume. ❑ Gas particles are separated and move individually. ❑ Gases change in shape and volume to fill the space they are in ❑ Heating causes some solids to melt into liquids and some liquids to evaporate into gases (the rate of evaporation is associated with temperature). ❑ Cooling causes some gases to condense into liquids and some liquids to freeze into solids. ❑ The water cycle shows how water evaporates from Earth's surface, travels up into the atmosphere, forms into clouds and then falls back to the surface as precipitation. ***Working Scientifically*** ❑ ❑ Use a thermometer to **measure** temperature and know there are two main scales used to measure temperature. ❑ **Group information** according to common factors. ❑ Use **evidence** to answer questions or to support their findings.	air cooled crystals expand flow freeze heat ice/water/steam melt melting point pour powder substance temperature volume	boil boiling point change of state compress condense degrees Celsius evaporate freezing point gas liquid matter particle precipitation solid viscous water (vapour)	

Tier 1	Tier 2	Tier 3
Basic vocabulary *To be used but require little or no explicit instruction.*	***Academic vocabulary*** *To be taught and assessed. Words that could be used across disciplines.*	**Context Specific** *Specific vocab that will normally relate to one subject – to be taught and assessed*

Science – KS2	Year 5		
Key Knowledge	**Key Vocabulary**		
Component of Learning Forces	**Tier 1**	**Tier 2**	**Tier 3**
Key Primary Theme: **Friction** **Gravity** All objects have forces acting upon them.	drag force friction gears levers mechanisms motion pulleys weight	air resistance contact force gravity non-contact force streamlined surface area water resistance	
Initial knowledge ❑ Friction can stop or slow down a moving object. ❑ Friction is a contact force between two surfaces trying to move across each other. ❑ Friction always works in the opposite direction to that in which the object is moving. ❑ Water resistance is the force on objects floating on or moving in water. ❑ A lever is a machine that allows movement of heavy objects			
Sticky knowledge to be taught & assessed for end goal. ❑ Frictional force is any force that is caused due to friction (e.g., a brake on a bicycle wheel) ❑ Surface resistance is the force on objects moving across a surface, such as an ice-skater skating on ice. ❑ A stationary object will only move when the force applied is greater than the friction, which acts in the opposite direction to the movement. ❑ 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. (E.g., parachute, sycamore seed) ❑ Gravity is an invisible force that pulls things to the centre of the Earth. ❑ Levers, pulleys and gears are all mechanisms that will allow a smaller force to have a greater effect. ❑ Our knowledge of forces has developed over time because of the work of scientists such as Galileo and Isaac Newton			
Working Scientifically ❑ Use their science experiences to explore ideas and **raise different kinds of questions** e.g., the effects of air resistance. ❑ **Select and plan** the most appropriate type of scientific enquiry (fair test) to use to answer specific questions e.g., exploring falling paper cones or cupcake cases. Explore resistance in water by making and testing boats of different shapes. ❑ **Make decisions** about what observations to make, what measurements to use and how often or how long to make them for. ❑ **Decide how to record data and results** of increasing complexity from a choice of familiar approaches, diagrams, classification keys, tables, scatter graphs, bar and line graphs. ❑ **Recognise and control** variables. ❑ **Observe** the effects of friction on movement e.g., the effects of a brake on a bicycle wheel. ❑ Use relevant **scientific language** and illustrations to discuss, communicate and justify their scientific ideas (non-statutory) ❑ Using **scientific equipment** (timers and newton metre), with increasing accuracy and precision, taking repeat readings when appropriate. ❑ **Report and present findings** from enquiries, including conclusions, causal relationships and explanations of and a degree of trust in results.			

Component of Learning Animals including humans (To be taught alongside RSE)	Tier 1	Tier 2	Tier 3
Key Primary Theme **Humans and animal change** Animals and humans go through developmental stages within their lives. ***Initial knowledge*** ❑ Human children are helpless at birth and become more independent over several years. ***Sticky knowledge to be taught and assessed for end goal.*** ❑ Mammals have different gestation periods. ❑ Males and females both experience puberty, with some similarities and some differences. ❑ Stages of a human life include baby, child, adolescent, and adult. ***Working Scientifically*** ❑ Use their science experiences to explore ideas and **research different kinds of questions** e.g., finding out and recording the length and mass of a baby as it groups. ❑ **Select and plan the most appropriate type of scientific enquiry** (secondary research) to use to answer specific questions. ❑ **Present information** related to scientific enquiries in a range of ways including using IT. ❑ Able to **record data and present** them in a range of ways including diagrams, labels, classification keys, tables, scatter graphs and bar and line graphs.	adult baby elderly person teenager toddler	adolescent oestrogen fertilisation foetus gestation gestation hormones pituitary gland puberty reproduction species testosterone	

Component of Learning Living things and their habitats (To be taught alongside RSE)	Tier 1	Tier 2	Tier 3
Key Primary Theme **Animal Change** Animals can be grouped according to whether they lay eggs, undergo metamorphosis, and how they reproduce. ***Sticky knowledge to be taught and assessed for end goal.*** ❑ The flower is the reproductive part of a flowering plant. ❑ Flowers contain male sex organs called stamen and female sex organs of the stigma, style and ovary. ❑ Pollen must be moved to the stigma for reproduction to take place. ❑ Not all plants reproduce in this way. ❑ In general, the life cycles of plants and animals have three basic stages including a fertilised egg or seed, immature juvenile, and adult. ❑ Some organisms may have more than three life cycle stages, and the exact names of each stage can slightly differ depending on the species. ❑ Almost all large animals reproduce sexually. ❑ When a sperm cell fertilises an egg, it can grow into an embryo. ❑ Amphibians must lay their eggs in water. ❑ Birds lay eggs. ❑ Eggs do not start to develop until the parent incubates them. ❑ Our knowledge of living things has developed over time because of the work of animal behaviourists such as David Attenborough and Jane Goodall.	mammal amphibian insect bird plants animals	sexual germination pollination stamen stigma reproduction fertilise egg	sperm embryo
Working Scientifically *Ask questions such as:* ❑ Take **measurements**, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate. ❑ **Record data** and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs. ❑ **Report and present findings** from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations. ❑ **Identify scientific evidence** that has been used to support or ideas or arguments			

Component of Learning Properties and changes of materials	Tier 1	Tier 2	Tier 3
Key Primary Theme **Behaviour of materials** Materials have properties. Materials can be changed and can behave in different ways. ***Initial knowledge*** ❑ All materials have physical properties. A physical property is one that a person can measure without changing the material. ***Sticky knowledge to be taught and assessed for end goal.*** ❑ All materials also have chemical properties. A chemical property tells how a material will change into a different substance under special conditions. ❑ Reversible changes, like melting and dissolving, can be changed back again. ❑ A change is called irreversible if it cannot be changed back again. Irreversible changes, like burning, cannot be undone. ❑ Mixtures can be separated out by methods like filtering, sieving and evaporating. ❑ Some materials will dissolve in liquid to form a solution, and the solute can be recovered from a solution (for example salt from seawater) by evaporation of the solvent. ❑ Materials can have different combinations of properties, including electrical and thermal conductivity, magnetism and transparency. ***Working Scientifically*** ❑ **Plan** different scientific enquiries to answer questions e.g. Which materials would be the most effective for making a warm jacket? For wrapping ice-cream to stop it melting? For making black-out curtains? ❑ **Recognise and control variables** where necessary. ❑ **Observe** and **compare** the changes that take place, e.g., when burning different materials or baking bread or cakes. ❑ Make **predictions** based on information gleaned from investigations. ❑ Set up an **enquiry-based investigation** such as How chemical changes have an impact on our lives e.g. cooking. ❑ **Report** and **present** findings from enquiries ❑ Is **evaluative** when explaining findings from scientific enquiry	degrees Celsius rusting separate solidify evaporation	chemical condensing conductivity dissolve filtering insulation irreversible residue reversible changes sieving solubility solution	

Component of Learning Earth and space	Tier 1	Tier 2	Tier 3
Key Primary Theme **Earth as part of the solar system** Earth's relationship with the moon, sun and other planets	sphere/spherical	orbit planets rotate solar system Mars	Earth Jupiter Mercury Moon Neptune Pluto Saturn Sun Uranus Venus
Initial knowledge ❑ The Moon is not a light source. We can see it only because it reflects light from the Sun. ❑ The Sun appears to rise in the east, move across the sky, and set in the west. ❑ Day and night are caused by the rotation of the Earth, and that the Sun only appears to move across the sky. ❑ It is not safe to look directly at the sun, even when wearing dark glasses.			
Sticky knowledge to be taught and assessed for end goal. ❑ The Solar System consists of the Sun, eight planets, all of which orbit the Sun. ❑ The Moon orbits the Earth once every 28 days. The appearance of the Moon changes over a 28-day period because of its orbit around the Earth. ❑ Massive bodies such as planets and larger moons are approximately spherical because they are rounded by their own gravity. ❑ Earth is the third planet from the sun and the only world known to support an atmosphere with free oxygen, oceans of liquid water on the surface, and life**.** ❑ Our knowledge of the solar system has developed over time because of the work of scientists such as Ptolemy, Alhazen and Copernicus			
Working Scientifically ❑ **Ask questions** such as: ➢ Why does the moon appear as different shapes in the night sky? ➢ Why do shadows change during the day? ❑ **Record data and results** of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs.			

Tier 1	Tier 2	Tier 3
Basic vocabulary *To be used but require little or no explicit instruction.*	***Academic vocabulary*** *To be taught and assessed. Words that could be used across disciplines.*	**Context Specific** *Specific vocab that will normally relate to one subject – to be taught and assessed*

Science – KS2	Year 6		
Key Knowledge	**Key Vocabulary**		
Component of Learning Animals including humans	**Tier 1**	**Tier 2**	**Tier 3**
Key Primary Theme: **Some organs are essential.** The functions of the circulatory system ***Initial knowledge*** ❑ The heart, blood and blood vessels make up the human circulatory system. ❑ The heart is a muscle that pumps blood around the body. ❑ Blood vessels carry blood around the body. ❑ Blood can be oxygenated or de-oxygenated. ***Sticky knowledge to be taught & assessed for end goal.*** ❑ Blood is made up of different components: plasma, platelets, white blood cells, red blood cells. ❑ Blood is transported in a circuit around the body: heart to lungs, lungs to heart, heart to body, body to heart. ❑ The heart has two large chambers called ventricles and two smaller chambers called atria. ❑ The aorta is the blood vessel taking blood from the heart to the body. ❑ Know that diet, exercise, drugs and lifestyle can impact on the bodies function (link to DART) ❑ The process of absorbing nutrients from food is called digestion. ❑ The circulatory system plays a part in transporting nutrients, oxygen and water around the body. ***Working Scientifically*** ❑ **Plan** different types of **scientific enquiries** to answer questions, including recognising and controlling variables where necessary e.g. What is the relationship between oxygen and blood? or how does exercise affect pulse? ❑ Take **measurements**, using a range of **scientific equipment**, with increasing accuracy and precision - taking repeat readings when appropriate. ❑ **Record** data and results of increasing complexity using scientific **diagrams** and labels, classification keys, tables, scatter graphs, bar and line graphs. ❑ **Report** and **present** findings from enquiries, including conclusions, in oral and written forms such as displays and other presentations. ❑ **Identify** scientific evidence and research about the relationship between diet, exercise, drugs, lifestyle and health	blood diet drugs exercise heart lifestyle lungs nutrients oxygen pulse pumps	atrium carbon dioxide cardiovascular deoxygenated oxygenated veins	blood vessels capillaries circulatory system pulmonary ventricles

Component of Learning Electricity	**Tier 1**	**Tier 2**	**Tier 3**
Key Primary Theme **Manipulating sources of power** Electricity is a form of energy that can give things the ability to move and work. ***Initial knowledge*** ❑ Electricity is a form of energy. Energy is needed to make things happen. ***Sticky knowledge to be taught and assessed for end goal.*** ❑ The brightness of a bulb is associated with the number of cells or the voltage. ❑ A bulb in the circuit slows down (resists) the flow of electricity. More bulbs, wired in series, will slow down the flow even more so the bulbs become dimmer. ❑ Materials that allow electricity to flow within them are electrical conductors. Insulators are materials that do not allow electricity to flow within them. ❑ A circuit connected in series contains components attached to each other, like holding hands in a circle. Components connected in a parallel circuit are connected across each other. ***Working Scientifically*** ❑ Construct simple series circuit, to help **answer questions** about what happens when they try different components e.g., switches, bulbs, buzzers and motors. ❑ Represent a simple circuit in a **diagram** using recognised symbols. ❑ **Systematically identify** the effect of changing one component at a time in a circuit.	battery closed switch. communicate device electricity negative open switch pole positive sign switch terminal	cell component convention conventional current parallel circuit series circuit symbol	

Component of Learning Light	Tier 1	Tier 2	Tier 3
Key Primary Theme **Behaviour of light** Light travels in straight lines. It travels from the light source to an object and then reflects to our eyes. ***Initial knowledge*** ❑ We see things because light travels from light sources to our eyes or from light sources to objects and then to our eyes. ❑ Light travels in straight lines. ❑ Shadows have the same shape as the objects that cast them. ***Sticky knowledge to be taught and assessed for end goal.*** ❑ A shadow is larger when the object is closer to the light source. ❑ Shadows can be elongated/shortened depending on the angle of a light source. ❑ Light does not travel as fast when it has to pass through mediums that are different, such as air, water or glass. ❑ Rainbows are formed when the sun shines through water particles (transparent). When white light passes through, its 'bends' and splits into the range of colours which make white light (Refraction) ***Working Scientifically*** ❑ Set up a **fair test** when needed e.g., does light travel in straight lines? Where would you place a rear-view mirror on a car. ❑ Design and make a periscope and the concept of light traveling in a straight line to **explain** how it works. ❑ Plan different types of **scientific enquiries** to answer questions, including recognising and controlling variables where necessary. Extend their knowledge and experience of light by looking at a range of phenomena including rainbows, colours on soap bubbles, objects looking bent in water and coloured filters. ❑ **Report and present findings** from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations.	dull opaque reflection reflective materials shadow shiny translucent transparent	filters lens light source refraction	cornea iris pupil retina

Component of Learning Living things and their habitats:	Tier 1	Tier 2	Tier 3
Key Primary Theme **Classification** Classification is a system called taxonomy, which is used to organise organisms based on physical similarities, characteristics, and evolutionary relationships. ***Initial knowledge*** ❑ Animals can be broadly classified as vertebrates (those that have a spinal column) and invertebrates. ❑ Trees can be identified by examining their leaves. ***Sticky knowledge to be taught and assessed for end goal.*** ❑ All living things are classified into broad groups according to common observable characteristics. ❑ Today we use seven different levels of classification. ❑ Scientists have now divided living things into five larger groups called Kingdoms. ❑ Our understanding of the classification system has developed over time as a result of the work of Carl Linnaeus, which placed organisms into hierarchical groups. ❑ A dichotomous classification key has exactly two answers to each question. It key can be created by starting with one set and asking questions to repeatedly divide the set. ***Working Scientifically*** ❑ **Plan** different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary. ❑ Direct o**bservations,** to classify animals into vertebrates and invertebrates. ❑ **Record data and results** of increasing complexity using classification keys. ❑ **Report and present findings** from enquiries, including conclusions and written forms such as displays and other presentations.	environment fish amphibians reptiles birds mammals	micro-organism classification invertebrate vertebrates	

Component of Learning Evolution and Inheritance	Tier 1	Tier 2	Tier 3
Key Primary Theme **Evolution, Inheritance, Adaptation** Animals have **adapted** to suit their environment. Adaptation may lead to **evolution**	fossil natural diversity selection variation	genes adaptation ancestors characteristics genetic offspring evolved chromosomes inheritance	palaeontologist
Initial knowledge ❑ The Earth and living things have changed over time. ❑ Fossils provide information about living things that inhabited the Earth millions of years ago. ❑ Natural selection is the process through which animals and plants adapt to changes in their environment. ❑ If a species cannot adapt over time to changes in its environment, it may become extinct.			
Sticky knowledge to be taught and assessed for end goal. ❑ Living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents due to their genetics and characteristics. ❑ Animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution e.g., the study of finches. ❑ Charles Darwin proposed that all life has descended over time from common ancestors. ❑ Alfred Wallace jointly founded the Key Primary Theme of natural selection with Charles Darwin.			
Working Scientifically ❑ **Observe** and raise **questions** about animals and how they are adapted to their environment. ❑ Set up a **fair test** to investigate how animals are adapted to suit their environment e.g., finches and their beak. ❑ Know what the **variables** are in a given enquiry and can isolate each one when investigating. ❑ **Justify which variable** has been isolated in scientific investigation. ❑ **Record data and results** of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs. ❑ R**eport and present findings** from enquiries, including conclusions e.g., by analysing the advantages and disadvantages of specific adaptations e.g., being on two feet rather than four, having a long or short beak, having gills or lungs etc. ❑ Identify **scientific evidence** that has been used to support or explain genetic diversity.			

Glossary of terms

1. **Observation** – Using senses or tools to notice carefully and describe what happens.
2. **Comparative Test** – An investigation where one thing is changed and the effect is compared to something else.
3. **Fair Test** – A test in which only one variable is changed and all others are kept the same.
4. **Prediction** – A reasoned guess about what might happen in an investigation.
5. **Variables**:
   Independent Variable – What you change.
   Dependent Variable – What you measure.
   Controlled Variables – What you keep the same.
6. **Classification** – Grouping things based on their characteristics.
7. **Identification** – Naming or recognising a living thing, object, or material.
8. **Pattern Seeking** – Looking for patterns in data to draw conclusions.
9. **Research Using Secondary Sources** – Finding information from books, websites, or other non-practical sources.
10. **Evidence** – Information gathered through observation or measurement that supports a conclusion.
11. **Data** – Information collected during an investigation.
12. **Results** – The outcome of an investigation, often recorded in tables, charts, or graphs.
13. **Conclusion** – A summary of what was learned from an investigation, based on the data.
14. **Scientific Enquiry –**
    - Research using secondary sources.
    - Comparative and fair testing.
    - Observing over time.
    - Pattern seeking.
    - Identifying, classifying and grouping.
15. **Working Scientifically** –the understanding of the nature, processes and methods of science for each year group.