

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



Science

Curriculum Depth Map

Table of Contents

Aims.....	2
Intent.....	2
Disciplinary Knowledge	2
Conceptual Knowledge.....	2
Key Primary Themes.....	2
Implementation.....	3
Impact	3
The Foundations for Learning Science in the Early Years	5
Science Curriculum Depth Map – Progression of knowledge by Key Primary Themes	7
Biology.....	7
Animals Including Humans	7
Living Things and their Habitats	8
Plants.....	9
Evolution and Inheritance	9
Chemistry.....	10
Physics	11
Physics – Electricity.....	12
Physics - Forces	13
Physics - Light.....	14
Working Scientifically	15
Conceptual Knowledge Overview	16
Half Termly Component of Learning Overview per year group	16
Science – Key Primary Themes	17
Appendix – Key Knowledge and Vocabulary	18
• Foundation.....	18
• Year 1	22
• Year 2	24
• Year 3	26
• Year 4	29
• Year 5	32
• Year 6	37



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 Physics 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
<p>The principal focus of science teaching in Foundation is to foster curiosity about the world around them.</p> <ul style="list-style-type: none"> • 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. <p>Opportunities for scientific development are provided through adult-focused activities as well as in the classroom continuous provision.</p>
KS1
<p>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.</p> <ul style="list-style-type: none"> • 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
<p>The principal focus of science teaching in LKS2 is to enable pupils to broaden their scientific view of the world around them.</p> <ul style="list-style-type: none"> • 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
<p>The principal focus of science teaching in UKS2 is to enable pupils to develop a deeper understanding of a wide range of scientific ideas.</p> <ul style="list-style-type: none"> • 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
<p>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.</p> <ul style="list-style-type: none"> • 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	Living things and their habitats	Animals including humans (Changing Me – Jigsaw)
Sticky knowledge	<ul style="list-style-type: none"> 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. 	<ul style="list-style-type: none"> 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. 	<ul style="list-style-type: none"> Know that we live on planet earth. Know that there are other planets. <div>Everyday Materials</div> <ul style="list-style-type: none"> 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. 	<ul style="list-style-type: none"> 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. 	<ul style="list-style-type: none"> 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. 	<ul style="list-style-type: none"> 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.

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	<ul style="list-style-type: none">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.		<ul style="list-style-type: none">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.		<ul style="list-style-type: none">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	<ul style="list-style-type: none">Use senses and observe closely.Can talk about the things observed in the environment.Solve problems by trying many different ideas.Respond to new experiencesWatch and replicate how others do things.Repeat activities.		<ul style="list-style-type: none">Notice similarities and differences.Use skills they have been taught within their playUse a trial and error approachThink of their own ideasPlan how they will explore or playSolve problems using some given solutions – considering the most appropriate ideaMake independent choices of materialsConcentrate on achieving something that’s important to them		<ul style="list-style-type: none">Draw and discuss different things observed.Learn how to take care of other living thingsQuestion things that happenUse equipment and tools carefullySolve problems by independently thinking and trying solutionsCorrect their mistakes themselvesMake connections in their learningThink 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	healthy exercise weather		plastic wood	space moon rocket planet	crater astronaut meteor orbit telescope binoculars	animals eggs peck	life cycle minibeasts insects extinct antennae recycle	hatch hatchling egg tooth coop

Biology					
Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Animals Including Humans					
Classification of animals	Conditions for living	Conditions for living	Conditions for living	Human/Animal change	Essential Organs
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.
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.
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.
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					
Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Living Things and their Habitats					
	Habitats		Food Chains /Interdependency Habitat change	Animal and plant change	Classification
	Explore and compare 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.
	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.
	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.
	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					
Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Plants					Evolution and Inheritance
Conditions for growth (relating to plant structure)	Conditions for growth	Conditions for growth Conditions for reproduction			Evolution, Inheritance and Adaptation
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					
Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Everyday Materials	Everyday Materials	Rocks	States of Matter	Properties and Changes of materials	
Properties of Materials	Properties of Materials	Properties of Rocks	Behaviour of Matter	Behaviour of Materials	
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)).	
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.	
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					
Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Seasonal changes			Sound	Earth and Space	
Seasonal changes			Sound behaviour	Earth as part of the Solar System	
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					
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					
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					
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)

Working Scientifically				
EYFS	Year 1 & Year 2	Year 3 & Year 4	Year 5 & Year 6	
Use my senses and observe closely.	Can ask simple questions and recognise that they can be answered in different ways	Ask relevant questions and using different types of scientific enquiries to answer them	Plan different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary	
Can talk about the things observed in the environment.	Observe closely using simple equipment.	Set up simple practical enquiries, comparative and fair tests		
Solve problems by trying many different ideas.	Perform simple tests.	Make systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers	Take measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate	
Respond to new experiences	Identify and classify.		Record data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs	
Watch and replicate how others do things.	Gather and record data to help in answering questions, noticing patterns and relationships			
Repeat activities.		Gather, record, classify and present data in a variety of ways to help in answering questions		
Notice similarities and differences.	Use observations and ideas to suggest answers to questions including using simple secondary sources (internet, books, visitors).	Record findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables	Use test results to make predictions to set up further comparative and fair tests	
Use skills taught within play.	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].		Report on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions	Identify scientific evidence that has been used to support or refute ideas or arguments
Use a trial-and-error approach.				
Think of their own ideas			Identify differences, similarities or changes related to simple scientific ideas and processes	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
Plan how they will explore or play				
Solve problems using some given solutions – considering the most appropriate idea	Use results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions			
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				

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 <i>To be used but require little or no explicit instruction.</i>	Academic vocabulary <i>To be taught and assessed. Words that could be used across disciplines.</i>	Context Specific <i>Specific vocab that will normally relate to one subject – to be taught and assessed</i>

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. <input type="checkbox"/> I need exercise to help keep my body healthy. <input type="checkbox"/> Moving and resting are good for my body. <input type="checkbox"/> Washing my hands is a way of keeping my body healthy. <input type="checkbox"/> Physical features of humans include hair, skin colour, eye colour. These make us unique.			
Explore and learn in continuous provision. <input type="checkbox"/> Explore different senses. <input type="checkbox"/> Tell you what I can see, hear and feel when I am outside. <input type="checkbox"/> Explore different weather and materials. <input type="checkbox"/> Explore how the wind can move objects. <input type="checkbox"/> Explore how objects move in water. <input type="checkbox"/> Listen to sounds outside and identify the source.			
Working Scientifically <input type="checkbox"/> Use senses and observe closely. <input type="checkbox"/> Can talk about the things observed in the environment. <input type="checkbox"/> Solve problems by trying many different ideas. <input type="checkbox"/> Respond to new experiences. <input type="checkbox"/> Watch and replicate how others do things. <input type="checkbox"/> 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	weather	
Link to KS1Key Primary Themes Y1 – Seasonal Changes	winter summer		
Sticky knowledge: taught & assessed for end goal. <input type="checkbox"/> The weather changes in each of the seasons. <input type="checkbox"/> Winter is the coldest season and summer is the hottest season. <input type="checkbox"/> Leaves change colour and fall from the trees during Autumn			
Explore and learn in continuous provision <input type="checkbox"/> Explore different senses. <input type="checkbox"/> Tell you what I can see, hear and feel when I am outside. <input type="checkbox"/> Explore different weather and materials. <input type="checkbox"/> Explore how the wind can move objects. <input type="checkbox"/> Explore how objects move in water. <input type="checkbox"/> Listen to sounds outside and identify the source.			
Working Scientifically <input type="checkbox"/> Use senses and observe closely. <input type="checkbox"/> Can talk about the things observed in the environment. <input type="checkbox"/> Solve problems by trying many different ideas. <input type="checkbox"/> Respond to new experiences <input type="checkbox"/> Watch and replicate how others do things. <input type="checkbox"/> 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	crater
Link to KS1Key Primary Themes No KS1 Key Primary Theme links – revisited in Y5		rocket planet	astronaut meteor orbit telescope binoculars
Sticky knowledge: taught & assessed for end goal. <input type="checkbox"/> Know that we live on planet earth. <input type="checkbox"/> Know that there are other planets.			
Explore and learn in continuous provision <input type="checkbox"/> Tell you any changes I notice outside in comparison to autumn. <input type="checkbox"/> Explore how materials can be changed e.g. ice, choc, butter. <input type="checkbox"/> Observe, measure and record how materials change when heated and cooled. <input type="checkbox"/> Explore a range of materials, including natural and human-made materials. <input type="checkbox"/> Make objects from different materials, including natural materials. <input type="checkbox"/> Explore how craters are formed. <input type="checkbox"/> Learn about space travel.			
Working Scientifically <input type="checkbox"/> Notice similarities and differences. <input type="checkbox"/> Use skills they have been taught within their play <input type="checkbox"/> Use a trial and error approach <input type="checkbox"/> Think of their own ideas <input type="checkbox"/> Plan how they will explore or play <input type="checkbox"/> Solve problems using some given solutions – considering the most appropriate idea <input type="checkbox"/> 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. <input type="checkbox"/> Plastic and wood are materials. <input type="checkbox"/> We use different materials to make different things. Building blocks are usually made from wood but Duplo is made from plastic. <input type="checkbox"/> A material is what something is made from. <input type="checkbox"/> Paper can be recycled. Some materials cannot be recycled.			
Explore and learn in continuous provision <input type="checkbox"/> Tell you any changes I notice outside in comparison to autumn. <input type="checkbox"/> Explore how materials can be changed e.g. ice, choc, butter. <input type="checkbox"/> Observe, measure and record how materials change when heated and cooled. <input type="checkbox"/> Explore a range of materials, including natural and human-made materials. <input type="checkbox"/> Make objects from different materials, including natural materials. <input type="checkbox"/> Explore how craters are formed. <input type="checkbox"/> Learn about space travel.			
Working Scientifically <input type="checkbox"/> Notice similarities and differences. <input type="checkbox"/> Use skills they have been taught within their play <input type="checkbox"/> Use a trial-and-error approach <input type="checkbox"/> Think of their own ideas <input type="checkbox"/> Plan how they will explore or play <input type="checkbox"/> Solve problems using some given solutions – considering the most appropriate idea <input type="checkbox"/> 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. <input type="checkbox"/> Some minibeasts live in woodland. <input type="checkbox"/> Some minibeasts live in a meadow. <input type="checkbox"/> Most plants need sunlight and water to grow. <input type="checkbox"/> Trees have different features such as their leaves. We can use these to identify them. <input type="checkbox"/> Plants have roots. <input type="checkbox"/> Plants are living things. <input type="checkbox"/> Some plants have flowers but some do not.			
Explore and learn in continuous provision <input type="checkbox"/> Explore plants and animals in the natural environment. <input type="checkbox"/> Compare different environments eg. The woodland and the school grounds. <input type="checkbox"/> Explore different habitats including revisiting rainforests.			
Working Scientifically <input type="checkbox"/> Draw and discuss different things observed. <input type="checkbox"/> Learn how to take care of other living things <input type="checkbox"/> Question things that happen <input type="checkbox"/> Use equipment and tools carefully <input type="checkbox"/> Solve problems by independently thinking and trying solutions <input type="checkbox"/> Correct their mistakes themselves <input type="checkbox"/> Make connections in their learning <input type="checkbox"/> 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. <input type="checkbox"/> 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. <input type="checkbox"/> Parts of the body include head, shoulders, knees and toes. <input type="checkbox"/> Sleep is good for my body. Know that cleaning your teeth is good oral hygiene			
Explore and learn in continuous provision <input type="checkbox"/> Tell you any changes I notice outside in comparison to autumn. <input type="checkbox"/> Explore how materials can be changed e.g. ice, choc, butter. <input type="checkbox"/> Observe, measure and record how materials change when heated and cooled. <input type="checkbox"/> Explore a range of materials, including natural and human-made materials. <input type="checkbox"/> Make objects from different materials, including natural materials. <input type="checkbox"/> Explore how craters are formed. <input type="checkbox"/> Learn about space travel.			
Working Scientifically <input type="checkbox"/> Notice similarities and differences. <input type="checkbox"/> Use skills they have been taught within their play <input type="checkbox"/> Use a trial and error approach <input type="checkbox"/> Think of their own ideas <input type="checkbox"/> Plan how they will explore or play <input type="checkbox"/> Solve problems using some given solutions – considering the most appropriate idea <input type="checkbox"/> 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))			
<input type="checkbox"/> Some animals live in the wild, some can be kept as pets. <input type="checkbox"/> Dinosaurs are extinct. <input type="checkbox"/> Animals such as a Poison Dart Frog, two toed sloth and a Tapir live in some rain forests. <input type="checkbox"/> Chickens have a beak, two legs, feathers, wings. <input type="checkbox"/> Animals all have a life cycle e.g. chicks grow into chickens. <input type="checkbox"/> Humans grow from babies to adults.			
Explore and learn in continuous provision <input type="checkbox"/> Explore plants and animals in the natural environment. <input type="checkbox"/> Explore different habitats including revisiting rainforests.			
Working Scientifically <input type="checkbox"/> Draw and discuss different things observed. <input type="checkbox"/> Learn how to take care of other living things <input type="checkbox"/> Question things that happen <input type="checkbox"/> Use equipment and tools carefully <input type="checkbox"/> Solve problems by independently thinking and trying solutions <input type="checkbox"/> Correct their mistakes themselves <input type="checkbox"/> Make connections in their learning <input type="checkbox"/> Think of their own explanations			

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

Science – KS1	Year 1		
Key Knowledge	Key Vocabulary		
Component of Learning Everyday Materials	Tier 1	Tier 2	Tier 3
Key Primary Theme: Properties of materials Materials have different properties.	bendy brick elastic foil glass hard metal paper plastic rock shiny smooth soft stiff stretchy water wood	absorbent dull fabric material opaque properties rough transparent waterproof	
Initial knowledge <input type="checkbox"/> Distinguish between the name of an object and the material it is made from. <input type="checkbox"/> Hard things are not easily broken or bent. <input type="checkbox"/> Soft things are easy to cut, fold or change the shape of. <input type="checkbox"/> Stretchy things can be pulled longer or wider without breaking. <input type="checkbox"/> Rough things feel uneven and bumpy. <input type="checkbox"/> Smooth things have no lumps or bumps.			
Sticky knowledge: taught & assessed for end goal. <input type="checkbox"/> Materials are what an object is made from. <input type="checkbox"/> Shiny things reflect light. <input type="checkbox"/> Dull things do not look shiny. <input type="checkbox"/> Waterproof things keep water out. <input type="checkbox"/> Absorbent things soak up water. <input type="checkbox"/> You can see through some objects and not others (Aspirational Vocab: Transparent and Opaque)			
Working Scientifically <input type="checkbox"/> Know how to test the different properties of a material. <input type="checkbox"/> Compare materials. <input type="checkbox"/> Name some scientific equipment we might need when testing materials such as a pipette and a beaker. <input type="checkbox"/> Classify materials firstly by material, and then by their properties. <input type="checkbox"/> Use scientific vocabulary to describe their findings.			

Component of Learning Animals including humans	Tier 1	Tier 2	Tier 3
Key Primary Theme: Classification of animals Animals can be described and compared in a variety of ways. The human body has basic body parts.	fish birds pets wild pet hearing sight touch taste skin tongue neck elbows knees	amphibians reptiles mammals carnivores herbivores omnivores human	
Initial knowledge <input type="checkbox"/> Some animals live in the wild, some can be kept as pets. <input type="checkbox"/> Fish live and breathe under water. They have scaly skin and fins to help them swim. <input type="checkbox"/> All birds have a beak, two legs, feathers, wings. Some birds do not fly.			
Sticky knowledge to be taught and assessed for end goal. <input type="checkbox"/> 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). <input type="checkbox"/> Animals that mostly eat other animals (meat) are carnivores (tiger, sharks, eagle, crocodile). <input type="checkbox"/> Animals that only eat plants are herbivores (giraffe, rabbit, tortoise, snail). <input type="checkbox"/> Animals that eat both plants and other animals are omnivores (crabs, mallard, honey badger, worm). <input type="checkbox"/> Fish breathe through gills. <input type="checkbox"/> Mammals are animals that breathe air, grow hair or fur and feed on their mother's milk as a baby. <input type="checkbox"/> All reptiles have scales on their skin and are cold blooded. <input type="checkbox"/> Amphibians live in the water as babies and on land as they grow older. They have smooth, slimy skin.			
Working Scientifically <input type="checkbox"/> Use a hand lens to observe closely. <input type="checkbox"/> Use equipment such as a pooter to collect minibeasts, understanding how to handle and return them safely. <input type="checkbox"/> Can classify an animal using a classification tree. <input type="checkbox"/> Use secondary sources to find out information. <input type="checkbox"/> Explore our local area and answer questions about animals in their habitats using simple scientific language . <input type="checkbox"/> Compare different textures, sounds and smells using their senses.			

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.	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	
Initial knowledge <input type="checkbox"/> Some plants grow in the wild (daisy, dandelion, nettle) and some are planted in gardens and parks (rose, sunflower, daffodil). <input type="checkbox"/> Flowers attract insects and birds. <input type="checkbox"/> Petals are the colourful part of the flower. <input type="checkbox"/> Fruit contains the plant's seeds. <input type="checkbox"/> Seeds and bulbs grow into new plants.			
Sticky knowledge to be taught and assessed for end goal. <input type="checkbox"/> Deciduous trees have broad, flat leaves which fall off in winter. <input type="checkbox"/> Evergreen trees have hard leaves or needles that stay on the trees all year. <input type="checkbox"/> Roots take in water and nutrients from the soil. <input type="checkbox"/> The stem holds the plant up and carries the water and nutrients from the roots to the leaves and flowers. <input type="checkbox"/> Leaves catch sunlight to make energy.			
Working Scientifically <input type="checkbox"/> With support, plan a comparative test, comparing the roots of two different plants. <input type="checkbox"/> Set up and perform a comparative test to show how roots take in water. <input type="checkbox"/> With support, predict what will happen. <input type="checkbox"/> Begin to measure the growth of plants using standard units. <input type="checkbox"/> Gather data to answer a simple question. <input type="checkbox"/> With support, begin to draw conclusions based on their findings. <input type="checkbox"/> Draw a diagram to show the different parts of a plant.			

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.	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	
Initial knowledge <input type="checkbox"/> The weather changes in each of the seasons. <input type="checkbox"/> Summer is the hottest season and winter the coldest.			
Sticky knowledge to be taught and assessed for end goal. <input type="checkbox"/> In the UK we have four seasons: spring, summer, autumn and winter. <input type="checkbox"/> Seasons change throughout the year because of the way the Earth travels around the Sun. <input type="checkbox"/> In summer the days are longer and in winter they are shorter.			
Working Scientifically <input type="checkbox"/> Observe and record the weather using a chart . <input type="checkbox"/> Gather data about weather in other places (from a secondary source). <input type="checkbox"/> Understand that a weather forecast is a prediction of the weather. <input type="checkbox"/> State whether the predictions from the weather forecast were accurate . <input type="checkbox"/> Deliver a weather report based on observations . <input type="checkbox"/> Make a rain gauge to collect data on rainfall. <input type="checkbox"/> Use a thermometer to measure the temperature.			

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

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

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

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

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.	dead desert living ocean polar ponds rainforest rivers sea seashore senses shelter woodland	conditions food chain nutrition habitat excretion reproduce	respiration species microhabitat
Initial knowledge <input type="checkbox"/> Some things are living, somethings are dead and some things have never been alive.			
Sticky knowledge to be taught and assessed for end goal. <input type="checkbox"/> All living things move, respire (breathe), sense, grow, reproduce, excrete and feed (nutrition) (MRS GREN) <input type="checkbox"/> A habitat is a place that an animal lives. It provides the animal with food, water and shelter. <input type="checkbox"/> There are many different sorts of habitats and micro-habitats around the world from forests to grasslands and from mountain slopes to deserts. <input type="checkbox"/> Most living things are suited to living in a habitat e.g., camels have long lashes to keep out sand. <input type="checkbox"/> 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. <input type="checkbox"/> In a food chain, there are some living things that produce energy (producers) and some that use the energy (consumers).			
Working Scientifically <input type="checkbox"/> Classify and group animals in different ways. <input type="checkbox"/> Notice patterns and relationships between animals, their habitats and their needs for survival. <input type="checkbox"/> Use secondary sources (books) to answer questions. <input type="checkbox"/> Construct a food chain.			

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 <input type="checkbox"/> Humans and animals have different diets. We use the words carnivore, herbivore and omnivore to compare these. <input type="checkbox"/> A healthy meal will have a balance of carbohydrates, proteins and vegetables.			
Sticky knowledge to be taught & assessed for end goal. <input type="checkbox"/> 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. <input type="checkbox"/> Humans have skeletons and muscles for support, protection and movement. <input type="checkbox"/> Humans and some animals have a skull, spine, ribs and joints. <input type="checkbox"/> Some animals do have a spine and some do not (invertebrates; crabs, spiders, butterflies).			
Working Scientifically <input type="checkbox"/> Carry out research using secondary sources (e.g., visitor, books). <input type="checkbox"/> Present findings using written explanations and include diagrams when needed. <input type="checkbox"/> Draw diagrams and label them using scientific vocabulary . <input type="checkbox"/> Talk about the criteria for grouping, sorting and classifying . <input type="checkbox"/> 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 <input type="checkbox"/> Some objects like glass are transparent which means that light can shine through them. <input type="checkbox"/> Our main source of light on Earth comes from the Sun. <input type="checkbox"/> 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. <input type="checkbox"/> The Sun, other stars, fires, torches and lamps all make their own light and so are examples of sources of light. <input type="checkbox"/> A mirror is not a source of light, it reflects light. <input type="checkbox"/> Moving an object closer or further away from the light source will change the size of its shadow. <input type="checkbox"/> A light source is an object that produces light. <input type="checkbox"/> We see light sources because light travels from them into our eyes. <input type="checkbox"/> We see can see non-light sources because light from a light source reflects off them and travels into our eyes. <input type="checkbox"/> 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 <input type="checkbox"/> Ask relevant questions . <input type="checkbox"/> Observe at what time of day a shadow is likely to be at its longest and shortest. <input type="checkbox"/> Be prepared to change ideas as a result of what has been found out during a scientific enquiry. <input type="checkbox"/> 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	iron steel soil texture	crystals sedimentary metamorphic igneous organic matter fossil porous	
Initial knowledge <input type="checkbox"/> There are different types of rocks. <input type="checkbox"/> Humans have used rocks for millions of years, from early tools and weapons through to construction materials for modern buildings. <input type="checkbox"/> Different types of rock suit different purposes			
Sticky knowledge to be taught and assessed for end goal. <input type="checkbox"/> Rocks are formed in different ways. <input type="checkbox"/> Sediment deposited over time, often as layers at the bottom of lakes and oceans, forms sedimentary rocks. <input type="checkbox"/> Extreme pressure and heat over time forms metamorphic rocks. Examples are marble and slate. <input type="checkbox"/> When magma cools and solidifies it forms igneous rock. Examples are granite and pumice. <input type="checkbox"/> 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. <input type="checkbox"/> Soils are made from rocks and organic matter. <input type="checkbox"/> Fossils are formed when things that have lived are trapped within rock			
Working Scientifically <input type="checkbox"/> Ask questions such as: Where does a fossil come from? <input type="checkbox"/> Use secondary sources (books and internet) to find out what the main differences are between sedimentary and igneous rocks. <input type="checkbox"/> Report findings using oral explanations e.g., within a presentation.			

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.	air flowers leaves light nutrients nutrition roots soil stem trunk water	animal dispersal fertiliser reproduce seed formation seed dispersal	photosynthesis pollination
Initial knowledge <input type="checkbox"/> Trees provide shelter and food for wildlife. <input type="checkbox"/> Parts of a plant include roots, tuber, stem, bulb, trunk, branch, leaf, flower and fruit. Not all plants have the same features. <input type="checkbox"/> Some plants, but not all, are flowering plants.			
Sticky knowledge to be taught and assessed for end goal. <input type="checkbox"/> Trees absorb carbon dioxide and produce breathable air. <input type="checkbox"/> 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. <input type="checkbox"/> For a flowering plant to reproduce, pollen needs to move to the ovary of another flower. <input type="checkbox"/> Flowering plants reproduce through pollination. <input type="checkbox"/> Pollination is when pollen travels from the stamen of one flower to the stigma of another. <input type="checkbox"/> In insect pollination (animal dispersal), pollen sticks to an insect in one flower and rubs off in another. <input type="checkbox"/> 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 <input type="checkbox"/> Investigate our local area and record the plants that grow here. <input type="checkbox"/> Investigate different seed types, therefore different methods of seed dispersal (in the local area) <input type="checkbox"/> Decide what data to collect and the best way to report this (bar charts/other statistical tables (in line with Year 3 mathematics statistics). <input type="checkbox"/> Draw conclusions.			

Component of Learning Forces and Magnets	Tier 1	Tier 2	Tier 3
<p>Key Primary Theme:</p> <p>Magnetism:</p> <p>The force exerted by magnets when they attract or repel each other</p>	<p>push</p> <p>pull</p> <p>metal</p> <p>surface</p>	<p>magnetic pole</p> <p>attract</p> <p>repel</p> <p>force</p> <p>magnet</p> <p>magnetic</p> <p>north</p> <p>south</p>	
<p>Initial knowledge:</p> <ul style="list-style-type: none"> <input type="checkbox"/> Forces can be seen as pushes or pulls. <input type="checkbox"/> There are different uses for magnets. <input type="checkbox"/> Objects will move when affected by a push or a pull and will keep moving unless affected by other forces. 			
<p>Sticky knowledge to be taught and assessed for end goal.</p> <ul style="list-style-type: none"> <input type="checkbox"/> Objects move differently on different surfaces. <input type="checkbox"/> Some forces need contact between two objects but magnetic forces can act at a distance (e.g., opening a door, pushing a swing) <input type="checkbox"/> Some materials are magnetic (affected by a magnet) and some are not. <input type="checkbox"/> Everyday materials are grouped according to whether they are attracted to a magnet. <input type="checkbox"/> Magnets have two poles (north and south) <input type="checkbox"/> Magnets will attract or repel each other, depending on which poles are facing. 			
<p>Working Scientifically</p> <ul style="list-style-type: none"> <input type="checkbox"/> Observe how magnets attract or repel each other. <input type="checkbox"/> Group or classify different objects according to how they move. <input type="checkbox"/> Test how things move on different surfaces. <input type="checkbox"/> Investigate the behaviour of different magnets e.g., bar, ring, button, horseshoe. <input type="checkbox"/> Test the strengths of different magnets in a fair way. <input type="checkbox"/> Predict which materials are magnetic. <input type="checkbox"/> Draw conclusions explaining findings 			

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

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 <input type="checkbox"/> We should visit a dentist every 6 months. <input type="checkbox"/> All organisms need food to survive.			
Sticky knowledge to be taught & assessed for end goal. <input type="checkbox"/> The eight incisors are sharp and flat to cut food. <input type="checkbox"/> The four canine teeth are pointed and rip food. <input type="checkbox"/> Molars and premolars are bumpy and grind food. <input type="checkbox"/> The process of absorbing nutrients from food is called digestion. <input type="checkbox"/> The major parts of the human digestive system include the mouth, oesophagus, stomach, small intestine, and large intestine (colon).			
Working Scientifically <input type="checkbox"/> Ask relevant questions using scientific vocabulary. <input type="checkbox"/> 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 <input type="checkbox"/> 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 <input type="checkbox"/> A food chain shows how food energy moves through an ecosystem. <input type="checkbox"/> A food web can show more complex food relationships than a food chain. <input type="checkbox"/> The arrows in a food chain mean 'is eaten by', not 'eats'. <input type="checkbox"/> A food chain has a producer, prey and predators. <input type="checkbox"/> Plants are producers and create their own food using sunlight via photosynthesis. <input type="checkbox"/> Nutrients produced by plants move to primary consumers then to secondary consumers through food chains. <input type="checkbox"/> Animals are consumers and must eat other organisms.			
Habitat Change <input type="checkbox"/> Environments can change and this can sometimes pose dangers to living things. <input type="checkbox"/> Environmental change affects habitats differently. <input type="checkbox"/> An ecosystem is a group of organisms in one place which depend on each other to survive. <input type="checkbox"/> Different organisms are affected differently by environmental change. <input type="checkbox"/> Human activity significantly affects the environment.			
Working Scientifically <input type="checkbox"/> Ask questions and use scientific enquiry to answer them. <input type="checkbox"/> Create oral and written explanations , considering the audience. <input type="checkbox"/> Record an example of a food chain. <input type="checkbox"/> 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.	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	
Initial knowledge <input type="checkbox"/> A source of electricity (mains or battery) is needed for electrical appliances to work.			
Sticky knowledge to be taught and assessed for end goal. <input type="checkbox"/> Electricity is a type of energy that can build up in one place to flow to another. <input type="checkbox"/> Electricity can be generated by power stations, wind, the sun, water and other sources. <input type="checkbox"/> Electricity sources push electricity around a circuit. <input type="checkbox"/> A circuit must be complete for electricity to flow and devices to work; switches can be used to control this flow. <input type="checkbox"/> Some materials allow electricity to flow easily and these are called conductors (metals are good conductors). <input type="checkbox"/> Materials that do not allow electricity to flow easily are called insulators.			
Working Scientifically <input type="checkbox"/> Observe patterns (bulbs get brighter if more cells are added). <input type="checkbox"/> Plan and carry out a fair test. <input type="checkbox"/> Understand the importance of controlling variables. <input type="checkbox"/> Manage scientific equipment safely and responsibly (blubs, batteries, bulb holders, crocodile clips, wires). <input type="checkbox"/> Make predictions using plausible reasons. <input type="checkbox"/> Able to amend predictions according to findings. <input type="checkbox"/> Present findings using written explanations and include labelled diagrams , when needed.			

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.	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
Initial knowledge <input type="checkbox"/> Sounds are caused by a material vibrating. <input type="checkbox"/> Sounds can be a high or low pitch.			
Sticky knowledge to be taught and assessed for end goal. <input type="checkbox"/> Sounds travel in all directions from a source, including above and below, round corners and through materials. <input type="checkbox"/> 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. <input type="checkbox"/> The loudness of a sound is dependent on how strong the vibrations are. The size of these vibrations is known as the amplitude. <input type="checkbox"/> 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. <input type="checkbox"/> Sound is a form of energy that transfers in a longitudinal wave. <input type="checkbox"/> Our ear drums vibrate in a similar way to the original source of the vibration, allowing us to hear many different sounds.			
Working Scientifically <input type="checkbox"/> Set up a fair test, changing only one variable at a time. <input type="checkbox"/> Gather and record information using a chart, matrix or tally chart, depending on what is most suitable. <input type="checkbox"/> Write up findings using a plan, do and evaluate process. <input type="checkbox"/> Understand that repeating a test will increase the reliability of results.			

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.	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)	
Initial knowledge <input type="checkbox"/> Materials can be grouped into solids, liquids and gases. <input type="checkbox"/> 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. <input type="checkbox"/> Solid particles are packed together and do not move so that they can keep structure. <input type="checkbox"/> Solids retain their shape unless a force is applied to them, for example to cut or shape them. <input type="checkbox"/> Liquid particles remain grouped together but move. <input type="checkbox"/> Liquids take the shape of the bottom of the container they are in but do not change in volume. <input type="checkbox"/> Gas particles are separated and move individually. <input type="checkbox"/> Gases change in shape and volume to fill the space they are in <input type="checkbox"/> Heating causes some solids to melt into liquids and some liquids to evaporate into gases (the rate of evaporation is associated with temperature). <input type="checkbox"/> Cooling causes some gases to condense into liquids and some liquids to freeze into solids. <input type="checkbox"/> 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 <input type="checkbox"/> <input type="checkbox"/> Use a thermometer to measure temperature and know there are two main scales used to measure temperature. <input type="checkbox"/> Group information according to common factors. <input type="checkbox"/> Use evidence to answer questions or to support their findings.			

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

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 <input type="checkbox"/> Friction can stop or slow down a moving object. <input type="checkbox"/> Friction is a contact force between two surfaces trying to move across each other. <input type="checkbox"/> Friction always works in the opposite direction to that in which the object is moving. <input type="checkbox"/> Water resistance is the force on objects floating on or moving in water. <input type="checkbox"/> A lever is a machine that allows movement of heavy objects			
Sticky knowledge to be taught & assessed for end goal. <input type="checkbox"/> Frictional force is any force that is caused due to friction (e.g., a brake on a bicycle wheel) <input type="checkbox"/> Surface resistance is the force on objects moving across a surface, such as an ice-skater skating on ice. <input type="checkbox"/> A stationary object will only move when the force applied is greater than the friction, which acts in the opposite direction to the movement. <input type="checkbox"/> Air resistance is a friction force between the air and a moving object. <input type="checkbox"/> Air resistance is greater when the surface area of the moving object is large. (E.g., parachute, sycamore seed) <input type="checkbox"/> Gravity is an invisible force that pulls things to the centre of the Earth. <input type="checkbox"/> Levers, pulleys and gears are all mechanisms that will allow a smaller force to have a greater effect. <input type="checkbox"/> Our knowledge of forces has developed over time because of the work of scientists such as Galileo and Isaac Newton			
Working Scientifically <input type="checkbox"/> Use their science experiences to explore ideas and raise different kinds of questions e.g., the effects of air resistance. <input type="checkbox"/> 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. <input type="checkbox"/> Make decisions about what observations to make, what measurements to use and how often or how long to make them for. <input type="checkbox"/> 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. <input type="checkbox"/> Recognise and control variables. <input type="checkbox"/> Observe the effects of friction on movement e.g., the effects of a brake on a bicycle wheel. <input type="checkbox"/> Use relevant scientific language and illustrations to discuss, communicate and justify their scientific ideas (non-statutory) <input type="checkbox"/> Using scientific equipment (timers and newton metre), with increasing accuracy and precision, taking repeat readings when appropriate. <input type="checkbox"/> 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.	adult baby elderly person teenager toddler	adolescent oestrogen fertilisation foetus gestation gestation hormones pituitary gland puberty reproduction species testosterone	
Initial knowledge <input type="checkbox"/> Human children are helpless at birth and become more independent over several years.			
Sticky knowledge to be taught and assessed for end goal. <input type="checkbox"/> Mammals have different gestation periods. <input type="checkbox"/> Males and females both experience puberty, with some similarities and some differences. <input type="checkbox"/> Stages of a human life include baby, child, adolescent, and adult.			
Working Scientifically <input type="checkbox"/> 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. <input type="checkbox"/> Select and plan the most appropriate type of scientific enquiry (secondary research) to use to answer specific questions. <input type="checkbox"/> Present information related to scientific enquiries in a range of ways including using IT. <input type="checkbox"/> 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.			

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.	mammal amphibian insect bird plants animals	sexual germination pollination stamen stigma reproduction fertilise egg	sperm embryo
Sticky knowledge to be taught and assessed for end goal. <input type="checkbox"/> The flower is the reproductive part of a flowering plant. <input type="checkbox"/> Flowers contain male sex organs called stamen and female sex organs of the stigma, style and ovary. <input type="checkbox"/> Pollen must be moved to the stigma for reproduction to take place. <input type="checkbox"/> Not all plants reproduce in this way. <input type="checkbox"/> In general, the life cycles of plants and animals have three basic stages including a fertilised egg or seed, immature juvenile, and adult. <input type="checkbox"/> Some organisms may have more than three life cycle stages, and the exact names of each stage can slightly differ depending on the species. <input type="checkbox"/> Almost all large animals reproduce sexually. <input type="checkbox"/> When a sperm cell fertilises an egg, it can grow into an embryo. <input type="checkbox"/> Amphibians must lay their eggs in water. <input type="checkbox"/> Birds lay eggs. <input type="checkbox"/> Eggs do not start to develop until the parent incubates them. <input type="checkbox"/> Our knowledge of living things has developed over time because of the work of animal behaviourists such as David Attenborough and Jane Goodall.			
Working Scientifically Ask questions such as: <input type="checkbox"/> Take measurements , using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate. <input type="checkbox"/> Record data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs. <input type="checkbox"/> 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. <input type="checkbox"/> 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.	degrees Celsius rusting separate solidify evaporation	chemical condensing conductivity dissolve filtering insulation irreversible residue reversible changes sieving solubility solution	
Initial knowledge <input type="checkbox"/> 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. <input type="checkbox"/> All materials also have chemical properties. A chemical property tells how a material will change into a different substance under special conditions. <input type="checkbox"/> Reversible changes, like melting and dissolving, can be changed back again. <input type="checkbox"/> A change is called irreversible if it cannot be changed back again. Irreversible changes, like burning, cannot be undone. <input type="checkbox"/> Mixtures can be separated out by methods like filtering, sieving and evaporating. <input type="checkbox"/> 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. <input type="checkbox"/> Materials can have different combinations of properties, including electrical and thermal conductivity, magnetism and transparency.			
Working Scientifically <input type="checkbox"/> 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? <input type="checkbox"/> Recognise and control variables where necessary. <input type="checkbox"/> Observe and compare the changes that take place, e.g., when burning different materials or baking bread or cakes. <input type="checkbox"/> Make predictions based on information gleaned from investigations. <input type="checkbox"/> Set up an enquiry-based investigation such as How chemical changes have an impact on our lives e.g. cooking. <input type="checkbox"/> Report and present findings from enquiries <input type="checkbox"/> Is evaluative when explaining findings from scientific enquiry			

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 <input type="checkbox"/> The Moon is not a light source. We can see it only because it reflects light from the Sun. <input type="checkbox"/> The Sun appears to rise in the east, move across the sky, and set in the west. <input type="checkbox"/> Day and night are caused by the rotation of the Earth, and that the Sun only appears to move across the sky. <input type="checkbox"/> 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. <input type="checkbox"/> The Solar System consists of the Sun, eight planets, all of which orbit the Sun. <input type="checkbox"/> 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. <input type="checkbox"/> Massive bodies such as planets and larger moons are approximately spherical because they are rounded by their own gravity. <input type="checkbox"/> 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. <input type="checkbox"/> Our knowledge of the solar system has developed over time because of the work of scientists such as Ptolemy, Alhazen and Copernicus			
Working Scientifically <input type="checkbox"/> Ask questions such as: ➤ Why does the moon appear as different shapes in the night sky? ➤ Why do shadows change during the day? <input type="checkbox"/> 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 <i>To be used but require little or no explicit instruction.</i>	Academic vocabulary <i>To be taught and assessed. Words that could be used across disciplines.</i>	Context Specific <i>Specific vocab that will normally relate to one subject – to be taught and assessed</i>

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	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
Initial knowledge <input type="checkbox"/> The heart, blood and blood vessels make up the human circulatory system. <input type="checkbox"/> The heart is a muscle that pumps blood around the body. <input type="checkbox"/> Blood vessels carry blood around the body. <input type="checkbox"/> Blood can be oxygenated or de-oxygenated.			
Sticky knowledge to be taught & assessed for end goal. <input type="checkbox"/> Blood is made up of different components: plasma, platelets, white blood cells, red blood cells. <input type="checkbox"/> Blood is transported in a circuit around the body: heart to lungs, lungs to heart, heart to body, body to heart. <input type="checkbox"/> The heart has two large chambers called ventricles and two smaller chambers called atria. <input type="checkbox"/> The aorta is the blood vessel taking blood from the heart to the body. <input type="checkbox"/> Know that diet, exercise, drugs and lifestyle can impact on the bodies function (link to DART) <input type="checkbox"/> The process of absorbing nutrients from food is called digestion. <input type="checkbox"/> The circulatory system plays a part in transporting nutrients, oxygen and water around the body.			
Working Scientifically <input type="checkbox"/> 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? <input type="checkbox"/> Take measurements , using a range of scientific equipment , with increasing accuracy and precision - taking repeat readings when appropriate. <input type="checkbox"/> Record data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs. <input type="checkbox"/> Report and present findings from enquiries, including conclusions, in oral and written forms such as displays and other presentations. <input type="checkbox"/> Identify scientific evidence and research about the relationship between diet, exercise, drugs, lifestyle and health			

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.	battery closed switch. communicate device electricity negative open switch pole positive sign switch terminal	cell component convention conventional current parallel circuit series circuit symbol	
Initial knowledge <input type="checkbox"/> Electricity is a form of energy. Energy is needed to make things happen.			
Sticky knowledge to be taught and assessed for end goal. <input type="checkbox"/> The brightness of a bulb is associated with the number of cells or the voltage. <input type="checkbox"/> 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. <input type="checkbox"/> Materials that allow electricity to flow within them are electrical conductors. Insulators are materials that do not allow electricity to flow within them. <input type="checkbox"/> 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 <input type="checkbox"/> Construct simple series circuit, to help answer questions about what happens when they try different components e.g., switches, bulbs, buzzers and motors. <input type="checkbox"/> Represent a simple circuit in a diagram using recognised symbols. <input type="checkbox"/> Systematically identify the effect of changing one component at a time in a circuit.			

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.	dull opaque reflection reflective materials shadow shiny translucent transparent	filters lens light source refraction	cornea iris pupil retina
Initial knowledge <input type="checkbox"/> We see things because light travels from light sources to our eyes or from light sources to objects and then to our eyes. <input type="checkbox"/> Light travels in straight lines. <input type="checkbox"/> Shadows have the same shape as the objects that cast them.			
Sticky knowledge to be taught and assessed for end goal. <input type="checkbox"/> A shadow is larger when the object is closer to the light source. <input type="checkbox"/> Shadows can be elongated/shortened depending on the angle of a light source. <input type="checkbox"/> Light does not travel as fast when it has to pass through mediums that are different, such as air, water or glass. <input type="checkbox"/> 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 <input type="checkbox"/> 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. <input type="checkbox"/> Design and make a periscope and the concept of light traveling in a straight line to explain how it works. <input type="checkbox"/> 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. <input type="checkbox"/> 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.			

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.	environment fish amphibians reptiles birds mammals	micro-organism classification invertebrate vertebrates	
Initial knowledge <input type="checkbox"/> Animals can be broadly classified as vertebrates (those that have a spinal column) and invertebrates. <input type="checkbox"/> Trees can be identified by examining their leaves.			
Sticky knowledge to be taught and assessed for end goal. <input type="checkbox"/> All living things are classified into broad groups according to common observable characteristics. <input type="checkbox"/> Today we use seven different levels of classification. <input type="checkbox"/> Scientists have now divided living things into five larger groups called Kingdoms. <input type="checkbox"/> 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. <input type="checkbox"/> 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 <input type="checkbox"/> Plan different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary. <input type="checkbox"/> Direct observations , to classify animals into vertebrates and invertebrates. <input type="checkbox"/> Record data and results of increasing complexity using classification keys. <input type="checkbox"/> Report and present findings from enquiries, including conclusions and written forms such as displays and other presentations.			

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 <input type="checkbox"/> The Earth and living things have changed over time. <input type="checkbox"/> Fossils provide information about living things that inhabited the Earth millions of years ago. <input type="checkbox"/> Natural selection is the process through which animals and plants adapt to changes in their environment. <input type="checkbox"/> 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. <input type="checkbox"/> 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. <input type="checkbox"/> 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. <input type="checkbox"/> Charles Darwin proposed that all life has descended over time from common ancestors. <input type="checkbox"/> Alfred Wallace jointly founded the Key Primary Theme of natural selection with Charles Darwin.			
Working Scientifically <input type="checkbox"/> Observe and raise questions about animals and how they are adapted to their environment. <input type="checkbox"/> Set up a fair test to investigate how animals are adapted to suit their environment e.g., finches and their beak. <input type="checkbox"/> Know what the variables are in a given enquiry and can isolate each one when investigating. <input type="checkbox"/> Justify which variable has been isolated in scientific investigation. <input type="checkbox"/> Record data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs. <input type="checkbox"/> Report 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. <input type="checkbox"/> Identify scientific evidence that has been used to support or explain genetic diversity.			