



SUBJECT ON A PAGE

Science

At Berry Hill Primary School our children are brave and exciting scientists, who investigate and explore the world around them with a critical and imaginative eye. We strive to promote a joy and excitement for learning, which our children can use in all other areas of the curriculum and ultimately of life. We want our children to experience many WOW moments and be able to approach unknown and unexplainable phenomenon with awe and wonder.



Intent – We aim to...

Explore concepts and be inspired by developing a thirst for learning in finding out why things happen in the way they do.

Ensure children know that good scientists use investigations and experiments to explore ideas and find out about the world.

Develop curiosity and excitement about the world around them and open them up to new possibilities.

Build on Prior Learning, using appropriate vocabulary so that children become confident and assured scientists who can communicate effectively.

Acquire specific skills and knowledge which help us to think scientifically and gain an understanding of scientific processes.



Implementation – How do we achieve our aims?

“Somewhere something is incredible is waiting to be known.” – Carl Sagan

How Science is structured across Berry Hill

	Y1	Y2	Y3	Y4	Y5	Y6
EARTH AND SPACE					X	
SEASONAL CHANGES	X					
ANIMALS INC. HUMANS	X	X	X	X	X	X
PLANTS	X	X	X			
EVERYDAY MATERIALS AND PROPERTIES	X	X			X	
ROCKS			X			
FORCES			X		X	
LIGHT			X			X
ELECTRICITY				X		X
EVOLUTION					X	X
LIVING THINGS AND THEIR HABITATS		X		X	X	X
STATES OF MATTER				X		
SOUND				X		

Working Scientifically

As Scientists, we will develop the following skills to support us in acquiring substantive knowledge:

Questioning



Observing and Measuring



Testing



Hypothesising



Interpreting and Recoding



Identifying and Clarifying



Ambition for all

The science curriculum at Berry Hill is ambitious for all pupils, including those with SEND. We have high expectations of what children can achieve, and believe that the curriculum should not be diluted or unnecessarily reduced for any learner. Adaptations are made to support individual needs through careful consideration of components within the curriculum. We introduce new material in 'manageable chunks'. The size of these chunks may differ between different groups of children, but are sequenced in a coherent way to enable pupils to build on prior knowledge. We know that too much information at once may be a barrier to learning and reduce the chances of pupils remembering what they have been taught.

We also understand that SEND pupils will benefit from instruction which is matched to their needs.

For those with complex needs, there are different curriculum expectations.

Assessment

Children are involved in the process of self-improvement, recognising their achievements and acknowledging where they could improve through teacher feedback, peer assessment and self-assessment.

Within a topic, teachers formatively assess children's acquisition of substantive and disciplinary knowledge using carefully planned assessment activities. Moderation is achieved through the use of TAPs, created by the Primary Science Teaching Trust

The Y2 and Y6 teachers assess children's level attainment at the end of the KS1 and KS2 against the programmes of study.

The national Curriculum

Key Stage 1

The principal focus of science teaching in key stage 1 is to enable pupils to experience and observe phenomena, looking more closely at the natural and humanly-constructed world around them. They should be encouraged to be curious and ask questions about what they notice. They should be helped to develop their understanding of scientific ideas by using different types of scientific enquiry to answer their own questions, including observing changes over a period of time, noticing patterns, grouping and classifying things, carrying out simple comparative tests, and finding things out using secondary sources of information. They should begin to use simple scientific language to talk about what they have found out and communicate their ideas to a range of audiences in a variety of ways. Most of the learning about science should be done through the use of first-hand practical experiences, but there should also be some use of appropriate secondary sources, such as books, photographs and videos.

Lower Key Stage 2

The principal focus of science teaching in lower key stage 2 is to enable pupils to broaden their scientific view of the world around them. They should do this through exploring, talking about, testing and developing ideas about everyday phenomena and the relationships between living things and familiar environments, and by beginning to develop their ideas about functions, relationships and interactions. They should ask their own questions about what they observe and make some decisions about which types of scientific enquiry are likely to be the best ways of answering them, including observing changes over time, noticing patterns, grouping and classifying things, carrying out simple comparative and fair tests and finding things out using secondary sources of information. They should draw simple conclusions and use some scientific language, first, to talk about and, later, to write about what they have found out.

Upper Key Stage 2

The principal focus of science teaching in upper key stage 2 is to enable pupils to develop a deeper understanding of a wide range of scientific ideas. They should do this through exploring and talking about their ideas; asking their own questions about scientific phenomena; and analysing functions, relationships and interactions more systematically. At upper key stage 2, they should encounter more abstract ideas and begin to recognise how these ideas help them to understand and predict how the world operates. They should also begin to recognise that scientific ideas change and develop over time. They should select the most appropriate ways to answer science questions using different types of scientific enquiry, including observing changes over different periods of time, noticing patterns, grouping and classifying things, carrying out comparative and fair tests and finding things out using a wide range of secondary sources of information. Pupils should draw conclusions based on their data and observations, use evidence to justify their ideas, and use their scientific knowledge and understanding to explain their findings.

Enquiry Approaches



Comparative Research



Observation



Pattern seeking



Identifying, grouping, classifying



Problem Solving

Impact – How will we know we have achieved our aims?

Pupils have the knowledge, skills and understanding to be able to think, talk, work and present like a scientist.

Pupils will become resilient, independent and curious scientists who ask questions and find things out for themselves

Pupils will be able to follow a line of enquiry through to drawing a conclusion

Pupils understand the uses and implications of science today but also in the future.

Pupils retain knowledge that is pertinent to Science with a real-life context.

KNOWLEDGE OF AN SCIENTIST

EXPERIMENTING AND INVESTIGATING		EYFS	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
	PREDICTING	Know how to suggest what might be ‘best’ or ‘worst’	Know how to suggest what might happen in an investigation.	Know how to suggest what might happen in an investigation using causal conjunction ‘because’.	Know how to predict cause and effect using the causal conjunction ‘because’ and wider evidence.	Know how to use knowledge and understanding to justify a prediction.	Know how to predict a trend, using a relationship prediction.	Know how to use knowledge and understanding to generate a testable hypothesis.
	OBSERVING	Know how to comment on what can be seen.	Know how to comment on what can be seen during an investigation.	Know how to identify changes during an investigation.	Know how to explain changes during an investigation.	Know how to use knowledge and understanding to explain changes during an investigation.	Know how to use knowledge and understanding to identify trends during an investigation.	Know how to identify trends during an investigation and make justified predictions for the rest of an investigation.
	EQUIPMENT	Know how to use a range of everyday items to investigate.	Know how to use scientific equipment, including measuring cylinders.	Know how to use a range of scientific equipment, including measuring cylinders and rulers.	Know how to select suitable equipment for a given task, including pipettes, rulers/measuring tapes and torches.	Know how to select and independently use a range of scientific equipment for a given task, including electrical equipment and thermometers.	Know how to select the most appropriate equipment for an independently designed task, including force meters and thermometers.	Know how to justify reasons for selecting specific equipment and identify possible alternatives. Use a wide range of scientific equipment.
		Know how to work safely when given instructions.	Know that there are some common dangers when using equipment.	Know how to notice risk and identify common dangers.	Know how to predict obvious risks and act on safety suggestions.	Know how to plan to minimize risk and work safely.	Know how to plan to minimise risk and describe safe use of equipment.	Know how to predict risks and explain how to plan and control risks.
	DESIGNING	Know how to suggest ideas to investigate.	Know how to suggest an idea to investigate and ask questions.	Know how to demonstrate how we something might be investigated.	Know how to demonstrate and explain how something might be investigated.	Know how to plan a fair test by selecting variables to change and measure.	Know how to plan a fair test and ensure controlled variables are kept the same.	Know how to plan a reliable and fair test.
		Know how to say how something might be investigated.	Know how to identify variables in an investigation.	Know how to identify which variable are being tested.	Know how to identify a range of variables which could be tested.	Know how to identify a range of variables which could be tested and explain appropriate tests.	Know how to identify a range of variables which could be tested and devise appropriate tests.	Know that some variables will be kept the same and devise tests which ensure these variables are controlled.
		Know how to follow a short demo and spoken instructions.	Know how to follow a short demo, spoken and picture instructions.	Know how to follow short spoken and written instructions in order.	Know how to follow instructions and write a simple method.	Know how to design and write a simple ordered method.	Know how to design and write a reliable ordered method.	Know how to design and write a reliable and precise method.

WORKING SCIENTIFICALLY

Disciplinary Knowledge

KNOWLEDGE OF AN SCIENTIST

CLASSIFICATION	IDENTIFYING	EYFS	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
		Know that some things are related to science e.g. plants, leaves, habitats	Know how to name a range of things related to science.	Know how to identify simple scientific things, ideas and processes.	Name a range of scientific things, ideas and processes.	Identify and describe changes in scientific processes.	Use knowledge and understanding to help identify unknown scientific things, ideas and processes.	Use knowledge, understanding and secondary resources to identify unknown scientific things, ideas and processes.
	CLASSIFYING	Know that you can sort using familiar features e.g. Shape, size, colour	Know that you can sort by similarity or difference.	Know that multiple groups can be used when sorting.	Know how to create criteria for sorting.	Know how to create and explain criteria for sorting.	Know how to create criteria for sorting, which includes a sub-group.	Know how to create criteria for sorting, which includes multiple sub-groups.
		Know how to use given instructions to sort.	Know how to sort using simple yes/no statements.	Know how to follow and complete simple classification keys with obvious differences.	Know how to construct a simple classification key using given information.	Know how to construct a simple classification key.	Know how to construct a complex classification key.	Know how to construct and explain a complex classification key.
	COMPARING	Know how to describe given things	Know how to identify obvious differences.	Know how to identify similarities and differences.	Know how to link properties to purpose and suitability.	Know Identify when properties change.	Know that properties change and be able to describe them.	Know how to explain how and why properties change.

DATA	COLLECTING	Know how to use non-standard units of measure and compare 2 things e.g.: heavier / lighter.	Know how to use non-standard units of measure and compare multiple things e.g.: lightest, light, heavier, heaviest. (comparative language)	Know that standard units are used to measure e.g: Length: cm / m Mass: g / kg Capacity: ml / l	Know how to measure and compare using standard units: Length: mm / cm / m Time: seconds / minutes / hours / days Capacity: ml / l	Know how to measure and compare using standard units: Length: mm / cm / m Mass: g / kg Capacity: ml / l Temperature: °C Time: seconds / minutes	Know how to measure, convert and compare using standard units: Length: mm / cm / m Mass: g / kg Capacity: ml / l Time: seconds / minutes Force: N	Know how to calculate an average from repeated measurements.
	TABLES	Know that information can be presented in a table.	Know how to use a simple, given table to record information.	Know how to use a simple, given table to tally and record totals.	Know how to draw and record a table of results.	Know how to construct a simple table, with headings, to compare cause and effect.	Know how to construct a complex table, with multiple headings, of results to show data.	Know how to construct a complex table of results to show repeated data.
	GRAPHS	Know how to use prepared pictograms to record observations.	Know how to construct a simple pictogram.	Know how to construct simple block charts.	Know how to use axes to construct a bar chart.	Know how to accurately and independently construct a bar chart.	Know how to use axes to construct a line graph.	Know how to accurately and independently construct and scale a line graph.
		Know how to add pictures to a given pictogram.	Know how to add pictures to own pictogram.	Know how to use a scale on a block chart to add the correct blocks.	Know how to draw bars on a given bar chart.	Know how to plot coordinates in the first quadrant.	Know how to join plotted coordinates with straight lines.	Know how to plot mean values and draw a trend line for linear data.

MAKING CONCLUSIONS		EYFS	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
	PATTERNS AND RELATIONSHIPS	Know how to recognise simple patterns e.g.: size.	Know how to recognise, create and describe simple patterns.	Know how to describe simple patterns in data and charts.	Know how to describe patterns in data, charts, and graphs.	Know how to describe patterns, trends and relationships in data, charts and graphs.	Know how to describe and compare patterns, trends and relationships in data, charts and graphs.	Know how to describe and compare changing patterns, trends and relationships in data, charts and graphs.
		Know how to use 'more' or 'less' to compare observations.	Know how to use 'more' or 'less' to compare numbers.	Know how to identify differences in sets of data.	Know how to identify and explain differences in sets of data.	Know how to identify and explain differences in sets of repeated data.	Know how to identify and explain differences in sets of repeated data and identify anomalies.	Know how to identify and explain, using margin of error, differences in sets of repeated data and identify anomalies.
	CONCLUDING	Know how to comment on changes that are observed during an investigation.	Know how to describe the changes that are happening.	Know how to recall and describe the changes that have happened.	Know how to describe the results linking cause and effect.	Know how to describe trends and use scientific observations to explain.	Know how to use data in the conclusions and use science to explain.	Know how to use primary and secondary data and ideas when concluding.
		Know how to talk about what was done.	Know how to explain what was done.	Know how to explore different ways to do things.	Know that there can be weaknesses in the methods.	Know how to identify weaknesses in the methods and suggest improvements.	Know how to identify how limitations in the methods might affect the results and suggest improvements.	Know how to identify limitations in the methods and use the results data to justify improvements.

		EYFS	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	YEAR 6
EXPLORING	QUESTIONING	Know how to express ‘what if’ questions during play.	Know how to ask ‘why’ questions.	Know how to ask ‘why’ and ‘what if’ questions in conjunction with one another.	Know how to use knowledge and understanding to ask ‘why’ and ‘what if’ questions.	Know how to use knowledge and understanding to develop scientific questions.	Know how to use knowledge and understanding to ask questions about observations.	Know how to use knowledge and understanding to challenge scientific ideas and concepts.
	EXPLAINING	Know how to recall some simple scientific facts.	Know how to recall simple scientific facts.	Know how to recall relevant scientific facts.	Know how to use science ideas and facts to describe and explain.	Know how to show developing knowledge and understanding of scientific ideas and concepts.	Know how to show clear knowledge and understanding of scientific ideas and concepts.	Know how to show secure knowledge and understanding of scientific ideas and concepts.
		Know how to pronounce simple scientific vocabulary – see EYFS vocabulary list.	Know how to remember and use relevant scientific vocabulary.	Know how to construct an oral sentence using scientific vocabulary.	Know how to use simple scientific vocabulary in a written sentence.	Know how to use scientific vocabulary during oral and written explanations.	Know how to accurately use a range of scientific vocabulary during oral and written explanations.	Know how to use a range of complex scientific vocabulary in a written report.
		Know how to describe what is happening using pictures or actions.	Know how to describe what is happening using vocabulary	Know how to describe and recall what has been observed.	Know how to describe simple scientific models / diagrams.	Know how to explain scientific models / diagrams.	Know how to use knowledge and understanding to describe and explain scientific models / diagrams.	Know how to use scientific models / diagrams to explain new events (linking prior knowledge).
	DIAGRAMS	Know how to match a picture to the correct label.	Know how to use a word bank to match a label to the correct part of an image	Know how to label a simple diagram using scientific vocabulary.	Know how to label and annotate a diagram with scientific information.	Know how to draw, label and annotate a drawn diagram with given scientific information.	Draw, label and annotate a drawn diagram with selected scientific information.	Know how to draw, label, annotate and explain drawn diagrams using scientific information.
	SECONDARY SOURCES	Know how to recall simple scientific facts.	Know how to select facts to use in an answer.	Know how to select relevant scientific facts to use in an answer.	Know how to link relevant scientific facts together in an answer.	Know how to use scientific facts to create an argument.	Know how to select and prioritise scientific facts to create an argument.	Know how to present a clear and logical argument using scientific facts.

Comparative / fair testing

Changing one variable to see its effect on another, whilst keeping all others the same.



Research

Using secondary sources of information to answer scientific questions.



Observation over time

Observing changes that occur over a period of time ranging from minutes to months.



Pattern-seeking

Identifying patterns and looking for relationships in enquiries where variables are difficult to control.



Identifying, grouping and classifying

Making observations to name, sort and organise items.



Problem-solving

Applying prior scientific knowledge to find answers to problems.



VOCABULARY PROGRESSION OF A SCIENTIST

	DISCIPLINARY VOCABULARY PROGRESSION	SUBSTANTIVE KNOWLEDGE VOCABULARY PROGRESSION						
EYFS	look closely, watch, touch, feel, smell, listen, same, different, compare, ask questions, record, sort, group	<u>Living things and their habitats</u> Home, warm, cold, leaves, trees, grow, animal, human, plants, stones, sticks,	<u>Seasonal Changes</u> Weather, sun, rain, snow, wind, thunder, lightening, fog, spring, summer, autumn, winter	<u>Earth and Space</u> Night time, stars, moon, darkness, planets, rocket, travel, Earth	<u>Light</u> Day time, night time, sun, moon, switch, shadow	<u>Materials</u> Glass, wood, plastic, metal, rough, smooth, wet, dry, hard, soft	<u>Animals inc. Humans</u> Mummy, Daddy ,Grandma, Granddad, uncle, auntie, brother, sister, hair, eyes, tall, small, nose, ears, mouth,	<u>Sound</u> Children able to identify and imitate outdoor sounds Phase 1 phonics Musical sounds Vocal sounds
YEAR 1	Observe, changes, patterns, sorting, grouping, compare, same, different, identify (name), equipment, resources, magnifying glass, spoon, teaspoon,	<u>Animals inc. Humans</u> Head, hair, arms, legs, shoulders, knees, feed, fingers, toes, eyes, ears, nose, mouth, teeth, stomach, back, neck, sense, hear, see, smell, touch, taste, amphibians, reptiles, mammals, carnivores, herbivores, omnivores,	<u>Plants</u> deciduous, evergreen, daisy, rose, poppy, dandelion, buttercup, conifer, grass, hedges, roots, trunk, branches, leaves, flowers, blossom, petals, fruit, roots, bulb, seed, stem,	<u>Everyday Materials</u> wood, plastic, glass, metal, water, rock, hard, soft, stretchy, stiff, shiny, dull, rough, smooth, bendy, not bendy, waterproof, not waterproof, absorbent, not absorbent, opaque, transparent, materials		<u>Seasonal Changes</u> Season, environment, period, darker, lighter		
YEAR 2	measure, data, record results, drawing, picture, table, tally chart, present, pictogram, block chart, Venn diagram, test, investigate, explore, hand lens, ruler, tape measure, metre stick, pipette, syringe, answer questions, interpret results, scientific enquiry, pattern seeking, comparative testing, observing over time, classifying, researching using secondary sources, practical work, thermometer,	<u>Everyday materials</u> Cardboard, brick, twisting, bending, stretching, squashing, wood, cardboard, plastic, metal, glass, brick, rock, paper, suitability, float, sink	<u>Plants</u> flowering plant, seed, bulb, light, temperature, germination, water	<u>Animals, including humans.</u> exercise, food types, hygiene, living, dead, never lived, offspring, identical, diet, drugs, exercise, life style, healthy, nutrients, water, animals, oxygen, food,		<u>Living things and their habitats</u> habitats, microhabitats, food chain, producer, prey, predator, consumer, life cycle, living, dead, never lived		<u>Uses of everyday materials</u> shadows, switches, suitability, materials, float, sink,
YEAR 3	fair testing, accurate, identification key, chart, similarity, difference, evidence, information, findings, characteristics, conclusion, explanation, diagram, classify,	<u>Light</u> Light, dark, reflect, natural, artificial, shadow, opaque, (light) source,	<u>Animals, including humans</u> balanced diet, transported, fats, fibre, carbohydrates, protein, water, vitamins, minerals, fruit, vegetables, invertebrates, vertebrates, skeletal, muscular system, support, protection, movement, nutritious, balanced,	<u>Rocks</u> rocks, properties, sedimentary, metamorphic, igneous, fossils,		<u>Forces and Magnets</u> magnetic, non-magnetic, , attract, repel, concrete, carpet, forces, magnets, poles,		<u>Plants</u> function, absorbed, function, flowering plant, transported, air, nutrients, pollination, seed formation, seed dispersal,
YEAR 4	relationships, data logger, stopwatch, timer, estimate, predict, data, bar chart, prediction, criteria, values, properties, reason, evaluate, improve, conduct	<u>Animals inc. Humans</u> Digestive system, mouth, teeth (premolars, molars, incisors, canines), tongue, oesophagus, stomach, small and large intestine, functions, carnivores, herbivores, healthy, producers, prey, predators, consumers	<u>States of Matter</u> Solids, liquids, gasses, water cycle, evaporation, condensation, materials, state	<u>Living things and their habitats</u> <u>Classification, environment, environmental change,</u>		<u>Sound</u> Vibrating/ tion, pitch, volume, sound source,		<u>Electricity</u> Appliances, series circuit, cells, wires, bulbs, switches, buzzers, conductor, insulator,
YEAR 5	evidence, justify, argument, comparative, investigate, construct, annotate	<u>Earth and Space</u> Heliocentric Solar system, Earth, planets, sun, moon, spherical, geocentric,	<u>Forces</u> Gravity, air resistance, water resistance, friction, lever, pulley, gears, effect	<u>Properties and changes of materials</u> Properties, hardness, solubility, transparency, conductivity (electric and thermal), conduct, insulators, dissolving, solution, substance, separated, filtering, sieving, evaporating, liquid, solid, gas		<u>Living things and their habitats</u> Mammals, amphibians, insects, birds, life cycles, sexual production, sexual and asexual reproduction		<u>Describe the changes as humans develop to old age</u> Evolution
YEAR 6	variables, independent variable, dependent variable, control variable, causal relationship, accuracy, precision, scatter graphs, bar graph, line graphs, force meter	<u>Light</u> Periscope, straight lines	<u>Electricity</u> Circuit diagram, Symbols, voltage, cells, components,	<u>Evolution and inheritance</u> Adaptations, identical, not identical, fossils		<u>Living things and their habitats</u> Vertebrates, non-vertebrates, micro-organisms, prostista, bacteria, fungi		<u>Animals inc. Humans</u> Circulatory system, vessels, arteries, veins, capillaries, left atrium, right atrium, left ventricle, right ventricle, blood, lifestyle, heart, lung

	AUTUMN 1	AUTUMN 2	SPRING 1	SPRING 2	SUMMER 1	SUMMER 2		
EYFS	LIVING THINGS AND THEIR HABITATS		SEASONAL CHANGES		LIGHT		ANIMALS INC. HUMANS	
	<ul style="list-style-type: none">Explore the natural world around themDescribe what they see, hear and feel whilst outsideRecognise some environments that are different to the one in which they live		<ul style="list-style-type: none">Explore the natural world around themDescribe what they see, hear and feel whilst outsideUnderstand the effect of changing seasons on the natural world around themKnow that seeds grow into plantsKnow that we need to respect and care for the natural environment and all living thingsUnderstand the key features of the life cycle of a plant and an animal.Understand the effect of changing seasons on the natural world around them.Know that plants have common parts, but they can look different.		<ul style="list-style-type: none">Describe what they see hear and feel outsideKnow that the sun gives off lightKnow that it is night-time when the sun isn't shining on us		<ul style="list-style-type: none">Talk about members of their immediate family and communityName and describe people who are familiar to themRecognise some environments are different to the one in which they live in.Use all their senses in hands-on exploration of natural materials.	
	SOUND		MATERIALS		FORCES		EARTH AND SPACE	
	<ul style="list-style-type: none">Describe what they see, hear and feel whilst outside.		<ul style="list-style-type: none">Explore the natural world around themDescribe what they see, hear and feel whilst outside.Talk about the differences between materials and changes they notice.Use all their senses in hands on exploration of natural materials.Explore collections of materials with similar and/or different properties		<ul style="list-style-type: none">Explore the natural world around them.Describe what they see, hear and feel whilst outside.		<ul style="list-style-type: none">Explore the natural world around them.	

KS1

SUBSTANTIVE SCIENCE OVERVIEW

	AUTUMN 1	AUTUMN 2	SPRING 1	SPRING 2	SUMMER 1	SUMMER 2
YEAR 1	<p>Biology: Animals inc. Humans: How can I describe a human or an animal scientifically?</p> <ul style="list-style-type: none">● Know the name of the following parts of the human body: head, hair, arms, legs, shoulders, knees, feet, fingers, toes, eyes, ears, nose, mouth, teeth, stomach, back, neck and be able to identify draw and label them.● Know which part of the body is associated with each sense: ears-hear, eyes-see, nose-smell, hands-touch, tongue-taste.● Know and name a variety of common animals, including fish, amphibians, reptiles, birds and mammals.● Know and name a variety of common animals that are carnivores, herbivores and omnivores. <p>Link Scientist (good communicator of science) David Attenborough</p>		<p>Biology: Plants: What do I know about plants in my area?</p> <ul style="list-style-type: none">● Know the name of a variety of deciduous and evergreen trees and be able to identify them.● Know common plants within the local area: daisy, rose, poppy, dandelion, buttercup, conifer, grass, hedges● Know the parts of a deciduous and evergreen tree: roots, trunk, branches, leaves.● Know the parts of plants using real life parts: leaves, flowers (blossom), petals, fruit, roots, bulb, seed, stem.● Know how to draw and label a diagram of a chosen plant from a real-life example. <ul style="list-style-type: none">● Know some trees keep their leaves all year while other trees drop their leaves during autumn and grow them again during spring. <p>Link Scientist: Ranger Hamza</p>		<p>Physical States: Everyday Materials- What materials are used within my environment and what are they used for?</p> <ul style="list-style-type: none">● Know the name of and be able to identify the following everyday materials: wood, plastic, glass, metal, water and rock.● Know how to distinguish between an object and the material from which it is made e.g. wood, plastic, glass, metal, water and rock.● Know how to compare everyday materials based on physical properties and justify these groupings.● Know that all objects are made of one or more materials.● Know that some objects can be made from different materials e.g. plastic, metal or wooden spoons.● Know that materials can be described by their properties (hard/soft, stretchy/stiff, shiny/dull, rough/smooth, bendy/not bendy, waterproof/ not waterproof, absorbent/ not absorbent, opaque/ transparent)● Know that some materials e.g. plastic can be in different forms with very different properties. <p>● Link scientist – John McAdam (Finding the best material for a purpose)</p>	
	<p>Longitudinal Unit of Study: Biology - Seasonal Changes: How do the seasons change?</p> <ul style="list-style-type: none">● Know that changes occur across the 4 seasons● Know that in the UK, the day length is longest at mid-summer (about 16 hours) and gets shorter each day until mid-winter (about 8 hours) before getting longer again.● Know that the weather also changes with the seasons.● Know that in the UK, it is usually colder and rainier in winter, and hotter and dryer in the summer.● Know that the change in weather causes many other changes. Key principles to cover are: numbers of minibeasts found outside; seed and plant growth; leaves on trees; and type of clothes worn by people. <p>Link Scientist – Luke Howard</p>					

	AUTUMN 1	AUTUMN 2	SPRING 1	SPRING 2	SUMMER 1	SUMMER 2
YEAR 2	<p>Physical States: Uses of everyday materials Can I identify similarities and differences between materials?</p> <ul style="list-style-type: none"> Know that all objects are made of one or more materials that are chosen specifically because they have suitable properties for the task. For example, a water bottle is made of plastic because it is transparent allowing you to see the drink inside and waterproof so that it holds the water. Know how to use a materials properties to make decisions of what to make an object from, the properties needed are compared with the properties of the possible materials, identified through simple tests and classifying activities. Know that a material can be suitable for different purposes and an object can be made of different materials. Know that objects made of some materials can be changed in shape by bending, stretching, squashing and twisting. For example, clay can be shaped by squashing, stretching, rolling, pressing etc. This can be a property of the material or depend on how the material has been processed e.g. thickness Know how to compare the use of a variety of everyday materials including wood, metal, plastic, glass, brick, rock, paper and cardboard Know how to Investigate how the shape of some materials can be changed: twisting, bending, stretching, squashing Know that when changing the shape of an object, some will return to its original shape whilst others will remain changed. Know how to conduct a comparative test to compare the suitability of everyday materials and identify particular uses. Know how to conduct an investigation to identify and test which materials float and which sink. Link Scientist: James Lind – comparative testing 	<p>Biology: Animals Including Humans What do animals, including humans, need to grow and how to they change as they become an adult?</p> <ul style="list-style-type: none"> Know that to grow into healthy adults, humans need the right amounts and types of food and exercise Know that good hygiene is also important in preventing infections and illnesses. Know how to use secondary sources to explain how to keep my body healthy, including the importance of exercise, eating the right amounts of different food types and hygiene. Know the needs of animals, including human basic needs for survival: oxygen, food, water. Know animals, including humans have offspring which grow into adults: lamb – sheep; calf – cow; chick – chicken; cub – lion; puppy – dog; kitten – cat; piglet – pig; tadpole – frog. Know that In other animals, such as chickens or insects, there may be eggs laid that hatch to young or other stages which then grow to adults. Know that the young of some animals do not look like their parents e.g. tadpoles Know that animals vary in many ways having different structures e.g. wings, tails, ears etc. They also have different skin coverings e.g. scales, feathers, hair. Know the key features of animals can be used to identify them. Know animals eat certain things - some eat other animals, some eat plants, some eat both plants and animals. Know humans have key parts in common, but these vary from person to person. Know Humans (and other animals) find out about the world using their senses. Know that humans have five senses – sight, touch, taste, hearing and smelling. These senses are linked to particular parts of the body Link scientists: <ul style="list-style-type: none"> Galen –129CE - Began his practice as a physician to gladiators and established a link between diet and health 	<p>Biology: Plants What affects the way seeds and bulbs develop over time?</p> <ul style="list-style-type: none"> Know how to grow a flowering plant and carry this out effectively. Know how to make regular observations, take regular measurements, and record these in a given table. Know how to make observations of how a seed or bulb grows into a mature plant and describe this in writing. Know that plants need water, light and a suitable temperature for germination Know how to set up a comparative test to demonstrate how changes in light, water and temperature effect the growth of plants. Know how changes in light, water and temperature effect the growth of plants. Know that plants may grow from either seeds or bulbs. Know that seeds or bulbs germinate and grow into seedlings which then continue to grow into mature plants. Know that mature plants may have flowers which then develop into seeds, berries, fruits etc. Know that seeds and bulbs need to be planted outside at particular times of year and they will germinate and grow at different rates. Know that some plants are better suited to growing in full sun and some grow better in partial or full shade. Know that plants also need different amounts of water and space to grow well and stay healthy Link Scientist: Anna Atkins, original name Anna Children, (born March 16, 1799, Tonbridge, Kent, England—died June 9, 1871, Halstead Place, Kent), English photographer and botanist noted for her early use of photography for scientific purposes – link to children taking photographs of seeds and bulbs to make careful observations. 	<p>Revisit of Core knowledge within wider contexts: Teachers to focus on the working scientific statements in depth, linking with a topic, or variety of topics which have been covered throughout the year. In this way, children will revisit some core learning, which will support transference into the long-term memory.</p>	<p>Biology: Living Things and their Habitats: How do animals live?</p> <ul style="list-style-type: none"> Know all objects are either living, dead or have never been alive. Know living things are plants (including seeds) and animals. Know dead things include dead animals and plants and parts of plants and animals that are no longer attached e.g. leaves and twigs, shells, fur, hair and feathers Know an object made of wood is classed as dead. Know objects made of rock, metal and plastic have never been alive. Know that animals and plants live in a habitat to which they are suited, which means that animals have suitable features that help them move and find food and plants have suitable features that help them to grow well. Know that the habitat provides the basic needs of the animals and plants – shelter, food and water. Know the habitat of the following living things and explain how they are suited to their habitat and depend on each other: fish – water, polar bears – arctic, camels – desert, birds– trees. Know that within a habitat there are different micro-habitats e.g. in a woodland – in the leaf litter, on the bark of trees, on the leaves. These micro-habitats have different conditions e.g. light or dark, damp or dry. These conditions affect which plants and animals live there. Know and name a variety of plants and animals in their habitats, including microhabitats. Know that the plants and animals in a habitat depend on each other for food and shelter etc. The way that animals obtain their food from plants and other animals can be shown in a food chain. Know how to classify (sort) things that are living, dead or have never lived. Know how to compare and explore differences between things that are living, dead or have never lived. Know how to construct, label and explain a simple food chain, identifying the producer, prey, predator, consumer. Know that animals including humans grow throughout their lives and life cycles. Know how to label a given diagram to show the following stages in the life cycles of animals; frog: frogspawn, tadpole, froglet, frog; Butterfly: egg, caterpillar, chrysalis, butterfly; chicken: egg, chick, chicken. Link Scientist: Carl Linnaeus 	<p>Revisit of Core knowledge within wider contexts:</p> <p>Teachers to focus on the working scientifically statements in depth, linking with a topic, or variety of topics which have been covered throughout the year. In this way, children will revisit some core learning, which will support transference into the long-term memory.</p>

LOWER KS2

SUBSTANTIVE SCIENCE OVERVIEW

	AUTUMN 1	AUTUMN 2	SPRING 1	SPRING 2	SUMMER 1	SUMMER 2
YEAR 3	<p>Physical States: Light- How does light affect what we see?</p> <ul style="list-style-type: none"> Know that we see objects because our eyes can sense light. Know that dark is the absence of light. Know that we cannot see anything in complete darkness. Know that some objects, for example, the sun, light bulbs and candles are sources of light. Know that objects are easier to see if there is more light. Know that some surfaces reflect light. Know that objects are easier to see when there is less light if they are reflective. Know that the light from the sun can damage our eyes and therefore we should not look directly at the sun and can protect our eyes by wearing sunglasses or sunhats in bright light. Know that shadows are formed on a surface when an opaque or translucent object is between a light source and the surface and blocks some of the light. Know that the size of the shadow depends on the position of the source, object and surface Know natural and artificial sources of light (natural – sunlight, artificial - lightbulb) Know how to conduct an investigation to observe what time of day a shadow is likely to be at its longest and shortest. <p>• Link Scientist: Ibn al Hatham</p>	<p>Biology: What makes animals and humans different from one another?</p> <ul style="list-style-type: none"> Know that animals, unlike plants which can make their own food, need to eat in order to get the nutrients they need. Know that food contains a range of different nutrients and we need to eat a nutritious, balanced diet to stay healthy: carbohydrates (including sugars), protein, vitamins, minerals, fats, fruit, vegetables, sugars, water – and fibre that are needed by the body to stay healthy. Know that a piece of food will often provide a range of nutrients. Know that humans, and some other animals, have skeletons and muscles which help them move and provide protection and support. Know that some animals have skeletons and some do not, and be able to classify examples (invertebrates: spider, snail, worms, crabs, starfish, scorpion, insects. Vertebrates: mammals, reptiles, fish, birds, and observe and compare their movements). Know that the skeletal and muscular system of a human provides support, protection and movement. <p>• Link Scientist: Looking at modern day science development – public health England (development of the eatwell plate)</p>	<p>Chemistry: How are rocks different?</p> <ul style="list-style-type: none"> Know how to classify different types of rocks using my own criteria (appearance and physical properties). Know that rock is a naturally occurring material. Know that there are different types of rock and be able to name and identify some rocks from within our surroundings e.g. sandstone, limestone, slate etc. which have different properties. Know that rocks can be hard or soft. Know that rocks have different sizes of grain or crystal. Know that rocks may absorb water. Know that rocks can be different shapes and sizes (stones, pebbles, boulders). Know that soils are made up of pieces of ground down rock which may be mixed with plant and animal material (organic matter). Know that the type of rock, size of rock pieces and the amount of organic matter affect the property of the soil. Know that some rocks contain fossils. Know that fossils were formed millions of years ago. Know that to form fossils, plants and animals died and fell to the seabed. They became covered and squashed by other material. Over time the dissolving animal and plant matter is replaced by minerals from the water. <p>• Link Scientist: Freidrich Mohs</p>	<p>Biology: What do plants need to function and grow?</p> <ul style="list-style-type: none"> Know that many plants, but not all, have roots, stems/trunks, leaves and flowers/blossom. Know that the roots absorb water and nutrients from the soil and anchor the plant in place. Know that the stem transports water and nutrients/minerals around the plant and holds the leaves and flowers up in the air to enhance photosynthesis, pollination and seed dispersal. Know the leaves use sunlight and water to produce the plant's food. Know some plants produce flowers which enable the plant to reproduce. Know that pollen, which is produced by the male part of the flower, is transferred to the female part of other flowers (pollination). This forms seeds, sometimes contained in berries or fruits which are then dispersed in different ways. Know that different plants require different conditions for germination and growth. Know that plants require air, water, light, nutrients from soil and room to grow for life and growth. Know the function of the following parts of flowering plants: roots, stem/trunk, leaves, flowers. Know that water is absorbed and transported in plants and observe how this happens. Know how to annotate a diagram to show how water is absorbed and transported in plants. Know how to set up a comparative test to demonstrate how changes in air, light, water, nutrients from soil, and room to grow effect the growth of plants. Know how to make regular observations, take regular measurements, and draw a table to record these measurements. Know the life cycle of a flowering plant and explain the following processes: pollination, seed formation and seed dispersal <p>• Link scientist: Jan Ingenhousz,</p>	<p>Physical States: What role do forces play in the world around us?</p> <ul style="list-style-type: none"> Know that a force is a push or a pull. Know that when an object moves on a surface, the texture of the surface and the object affect how it moves.(Objects may move better or it may hinder its movement e.g. ice skater compared to walking on ice in normal shoes.) Know how to compare and describe how objects move on different surfaces: concrete, carpet, wood, cardboard, plastic, metal. Know that a magnet attracts magnetic material. Know how to construct a simple table to identify and classify materials as either magnetic and non-magnetic. Know that iron and nickel and other materials containing these, e.g. stainless steel, are magnetic. Know that the strongest parts of a magnet are the poles. Know that magnets have two poles – a north pole and a south pole. Know that if two like poles, e.g. two north poles, are brought together they will push away from each other – repel. Know that if two unlike poles, e.g. a north and south, are brought together they will pull together – attract. Know how to annotate diagrams of magnets to predict whether the magnets will attract or repel and give reasons. <p>• Know that some forces require contact and some can act at a distance (opposite magnet poles can act at distance; a push requires contact).</p> <p>• Know how to compare and group together a variety of everyday materials based on whether they are attracted to a magnet, and identify some magnetic materials.</p> <p>• Link Scientist: Galileo Galilei, Michael Faraday</p>	<p>Revisit of Core knowledge within wider contexts:</p> <p>Teachers to focus on the working scientifically statements in depth, linking with a topic, or variety of topics which have been covered throughout the year. In this way, children will revisit some core learning, which will support transference into the long-term memory.</p>

LOWER KS2

SUBSTANTIVE SCIENCE OVERVIEW

	AUTUMN 1	AUTUMN 2	SPRING 1	SPRING 2	SUMMER 1	SUMMER 2
YEAR 4	<p>Biology: How are our bodies designed to help us break down and process food?</p> <ul style="list-style-type: none"> Know that food enters the body through the mouth. Know the process of digestion (digestion starts when the teeth start to break the food down. Saliva is added in the mouth and the tongue rolls the food into a ball. The food is swallowed and passes down the oesophagus to the stomach. Here the food is broken down further by being churned around and other chemicals are added. The food passes into the small intestine. Here nutrients are removed from the food and leave the digestive system to be used elsewhere in the body. The rest of the food then passes into the large intestine. Here the water is removed for use elsewhere in the body. What is left is then stored in the rectum until it leaves the body through the anus when you go to the toilet.) Know that humans have four types of teeth and explain their simple functions: incisors for cutting; canines for tearing; and molars and premolars for grinding (chewing). Know the function of the following parts of the digestive system: Mouth, tongue, teeth, oesophagus, stomach, small and large intestine. Know the differences in the teeth of carnivores and herbivores. Know how the teeth of carnivores and herbivores are suited to their purpose. Know how to keep teeth healthy and explain possible damages to teeth. Know how to construct, label and explain a simple food chain, identifying the producers, preys, predators, consumers. Link Scientist: William Beaumont 	<p>Chemistry: States of matter- How can materials change?</p> <ul style="list-style-type: none"> Know that a solid keeps its shape and has a fixed volume. Know that a liquid has a fixed volume but changes in shape to fit the container. Know that a liquid can be poured and keeps a level, horizontal surface. Know that a gas fills all available space, but it has no fixed shape or volume. Know that granular and powdery solids like sand can be confused with liquids because they can be poured, but when poured they form a heap and they do not keep a level surface when tipped. Each individual grain demonstrates the properties of a solid. Know how to classify examples of solids, liquids and gases using my own criteria. Know that melting is a state change from solid to liquid. Know that freezing is a state change from liquid to solid. Know that the freezing point of water is 0oC. Know that boiling is a change of state from liquid to gas that happens when a liquid is heated to 100oC and bubbles of the gas can be seen in the liquid. Know that evaporation is the same state change as boiling (liquid to gas), but it happens slowly at lower temperatures and only at the surface of the liquid. Know that evaporation happens more quickly if the temperature is higher, the liquid is spread out or it is windy. Know that condensation is the change back from a gas to a liquid caused by cooling. Know the stages of the water cycle (water at the surface of seas, rivers etc. evaporates into water vapour (a gas) and this rises, cools and condenses back into a liquid forming clouds. When too much water has condensed, the water droplets in the cloud get too heavy and fall back down as rain, snow, sleet etc. and drain back into rivers etc. This is known as precipitation.) Know how to draw, label and annotate a diagram of the water cycle to identify the part played by evaporation and condensation. Link Scientists: Daniel Farenhiet, Anders Celcius 	<p>Revisit of Core knowledge within wider contexts:</p> <p>Teachers to focus on the working scientifically statements in depth, linking with a topic, or variety of topics which have been covered throughout the year. In this way, children will revisit some core learning, which will support transference into the long-term memory..</p>	<p>Biology: Living things and their habitats- How are living things similar and different?</p> <ul style="list-style-type: none"> Know that living things can be grouped (classified) in different ways according to their features. Know that environments may change naturally which can affect the habitats of animals and humans (through flooding, fire, earthquakes) Know that humans also cause the environment to change. This can be in a good way (i.e. positive human impact, such as setting up nature reserves, garden ponds, ecologically planned parks,) or in a bad way (i.e. negative human impact, such as littering, ice caps melting, deforestation, drought, urbanisation, pollution.) Know that environments also change with the seasons (different living things can be found in a habitat at different times of the year) Know how to classify living things into multiple self-created and justified groups. Know how to construct and explain a simple classification key to group, identify and name a variety of living things in their local and wider environment. Know how to explore microhabitats in the local environment and use or create classification keys to identify, name and group a variety of living things. <p>Link Scientist: Carl Lineeaeus</p>	<p>Biology: How do we hear?</p> <ul style="list-style-type: none"> Know that a sound produces vibrations which travel through a medium from the source to our ears. Know that different mediums such as solids, liquids and gases can carry sound, but sound cannot travel through a vacuum (an area empty of matter). Know that the vibrations cause parts of our body inside our ears to vibrate, allowing us to hear (sense) the sound. Know that the loudness (volume) of the sound depends on the strength (size) of vibrations which decreases as they travel through the medium. Know that sounds decrease in volume as you move away from the source. Know that a sound insulator is a material which blocks sound effectively. Know that pitch is the highness or lowness of a sound and is affected by features of objects producing the sounds. For example, smaller objects usually produce higher pitched sounds. Know how to conduct a fair test to investigate the relationship between the size of an object and the pitch of the sound produced. Know how to conduct a fair test to investigate the relationship between the strength of the vibrations and the volume it produces. . <p>Link Scientist: Alexander Graham Bell</p>	<p>How does electricity make things work?</p> <ul style="list-style-type: none"> Know that many household devices and appliances run on electricity. Some plug in to the mains and others run on batteries. Know that an electrical circuit consists of a cell or battery connected to a component using wires. Know that if there is a break in the circuit, a loose connection or a short circuit, the component will not work. Know that a switch can be added to the circuit to turn the component on and off. Know that metals are good conductors so they can be used as wires in a circuit. Know that non-metallic solids are insulators except for graphite (pencil lead). Know that water, if not completely pure, also conducts electricity. Know how to construct a series circuit. Know how to draw and label a complete series circuit (picture representation) including cells, wires, bulbs, switches and buzzers. Know how to construct a table to identify examples of conductors and insulators, identifying metals as good conductors. <p>Link Scientist: Alessandro Volta</p>

	AUTUMN 1	AUTUMN 2	SPRING 1	SPRING 2	SUMMER 1	SUMMER 2
YEAR 5	<p>Physical States: Earth and Space- Where do we fit in the universe?</p> <ul style="list-style-type: none"> Know the Sun is a star. Know the sun is at the centre of our solar system. Know there are 8 planets. Know that the planets in our solar system travel around the Sun in fixed orbits. Know the Earth takes 365¼ days to complete its orbit around the Sun. Know the Earth rotates (spins) on its axis every 24 hours. Know that as the Earth rotates, half faces the Sun (day) and half is facing away from the Sun (night). Know that as the Earth rotates, the Sun appears to move across the sky. Know the Moon orbits the Earth and it takes about 28 days to complete its orbit. Know the Sun, Earth and Moon are approximately spherical. <ul style="list-style-type: none"> Know how to create a labelled and annotated heliocentric diagram of the solar system. <ul style="list-style-type: none"> Know how to annotate a diagram to explain how day and night are created, with apparent movement of the sun across the sky as a result of the Earth's rotation. Know how to draw diagrams to show, and explain in writing, how the geocentric model gave way to the heliocentric model. <p>• Link Scientist: Tim Peak, Nicolaus Copernicus</p>	<p>Physical States: Forces – How do forces affect our world?</p> <ul style="list-style-type: none"> Know that a force causes an object to start moving, stop moving, speed up, slow down or change direction. Know that gravity is a force that acts at a distance. Everything is pulled to the Earth by gravity. This causes unsupported objects to fall. Know that air resistance, water resistance and friction are contact forces that act between moving surfaces. The object may be moving through the air or water, or the air and water may be moving over a stationary object. Know that a mechanism is a device that allows a small force to be increased to a larger force. The pay back is that it requires a greater movement. The small force moves a long distance and the resulting large force moves a small distance, e.g. a crowbar or bottle top remover. Pulleys, levers and gears are all mechanisms, also known as simple machines Know how to draw a scientific diagram to explain what gravity is and that unsupported objects fall towards the Earth because of gravity. Know how to conduct a fair test to demonstrate the effects of air resistance. Know how to conduct a fair test to demonstrate the effects of water resistance. Know how to conduct a fair test to demonstrate the effects of friction. Know how levers, pulleys and gears allow a smaller force to have a greater effect. <p>• Link Scientist: Isaac Newton, Galileo Galilei</p>	<p>Revisit of Core knowledge within wider contexts:</p> <p>Teachers to focus on the working scientifically statements in depth, linking with a topic, or variety of topics which have been covered throughout the year. In this way, children will revisit some core learning, which will support transference into the long-term memory.</p>	<p>Chemistry: Properties and changes of materials – How does a material's properties affect its use?</p> <ul style="list-style-type: none"> Know that materials have different uses depending on their properties and state (liquid, solid, gas). Know that properties include hardness, transparency, electrical and thermal conductivity and attraction to magnets. Know that some materials will dissolve in a liquid and form a solution while others are insoluble and form sediment. Know that mixtures can be separated by filtering, sieving and evaporation. Know some changes to materials such as dissolving, mixing and changes of state are reversible, but some changes such as burning wood, rusting and mixing vinegar with bicarbonate of soda result in the formation of new materials and these are not reversible. Know how to compare and classify everyday materials based on their properties: hardness, solubility, transparency, conductivity (electrical and thermal). Know how to compare and classify everyday materials based on their response to magnets. Know how to conduct comparative fair test to test which materials conduct electricity. Know how to conduct comparative fair test to test which materials make the best insulators. Know how to conduct comparative fair test to test the best temperature for dissolving sugar and explain how this forms a solution. Know how to recover a substance from a solution. Know how some materials can be separated through filtering, sieving and evaporating. Know how water can change state into a liquid, gas or solid. <p>Link Scientist: Charles Macintosh , John Dunlop</p>	<p>Biology: How are living things similar / different?</p> <ul style="list-style-type: none"> Know that as part of their life cycle, plants and animals reproduce. Know that most animals reproduce sexually. This involves two parents where the sperm from the male fertilises the female egg. Know that animals, including humans, have offspring which grow into adults. Know that in humans and some animals, offspring will be born live, such as babies or kittens, and then grow into adults. In other animals, such as chickens or snakes, there may be eggs laid that hatch to young which then grow to adults. Know that some young undergo a further change before becoming adults e.g. caterpillars to butterflies. This is called a metamorphosis. Know that plants reproduce both sexually and asexually. Bulbs, tubers, runners and plantlets are examples of asexual plant reproduction which involves only one parent. Know that gardeners may force plants to reproduce asexually by taking cuttings. Know that sexual reproduction occurs through pollination, usually involving wind or insects Know how to classify animals into mammals, amphibians, insects and birds, and use secondary sources to describe the physical features of each. Know how to construct a classification key to classify one of the following: mammals, amphibians, insects, or birds. Know how to annotate diagrams of the following life cycles: mammal, amphibian, insect, and bird. Know and explain the differences between life cycles. <p>Link Scientist: Aristotle (384–322 BC): classification of living things</p>	<p>How do humans change as they develop to old age?</p> <ul style="list-style-type: none"> Know that when babies are young, they grow rapidly. Know that babies are very dependent on their parents. Know that as babies develop, they learn many skills. Know that at puberty, a child's body changes and develops primary and secondary sexual characteristics. This enables the adult to reproduce. Know how to annotate a picture to explain the evolution of humans over time, from baby to old age. <p>• Link scientists: Andreas Versallius, Matthias Jakob Schleiden and Theodor Schwann 1839 – links to animals being made of cells, and these cells ageing is what makes our bodies change</p>

UPPER KS2

SUBSTANTIVE SCIENCE OVERVIEW

	AUTUMN 1	AUTUMN 2	SPRING 1	SPRING 2	SUMMER 1	SUMMER 2
YEAR 6	<p>Biology: How do we see objects?</p> <ul style="list-style-type: none">Know that light appears to travel in straight lines, and we see objects when light from them goes into our eyes.Know that the light may come directly from light sources, but for other objects some light must be reflected from the object into our eyes for the object to be seen.Know that objects that block light (are not fully transparent) will cause shadows.Know that because light travels in straight lines the shape of the shadow will be the same as the outline shape of the object.Know how to annotate a diagram to explain how we see objects.Explore and describe different phenomena associated with light (eg: rainbows, colours on soap bubbles, objects looking bent in water, and coloured filters). <p>Link Scientist: Ibn al-Haytham</p>	<p>Physical states: What do we need to know about electricity to work with it effectively?</p> <ul style="list-style-type: none">Know that adding more cells to a complete circuit will make a bulb brighter, a motor spin faster or a buzzer make a louder sound.Know that if you use a battery with a higher voltage, the same thing happens.Know that adding more bulbs to a circuit will make each bulb less bright. Using more motors or buzzers, each motor will spin more slowly and each buzzer will be quieter.Know that turning a switch off (open) breaks a circuit so the circuit is not complete and electricity cannot flow.Know that any bulbs, motors or buzzers will then turn off when the switch is turned off or the circuit is broken.Know the recognised circuit symbols to draw simple circuit diagrams.Know how to draw and label a circuit diagram using correct symbols.Know dangers and precautions for working safely with electricity.Know how to conduct a fair test to demonstrate how the voltage of cells affects the brightness of a lamp or volume of a buzzer.Know that changing the components in a circuit can affect the brightness of bulbs, loudness of buzzers and the impact of on/off position of switches. <p>Link Scientist: Nikola Tesla</p>	<p>Biology: How do animals and humans adapt and change over time?</p> <ul style="list-style-type: none">Know that all living things have offspring of the same kind, as features in the offspring are inherited from the parents.Know that, due to sexual reproduction, the offspring are not identical to their parents and vary from each other.Know that plants and animals have characteristics that make them suited (adapted) to their environment.Know that if the environment changes rapidly, some variations of a species may not suit the new environment and will die.Know that if the environment changes slowly, animals and plants with variations that are best suited survive in greater numbers to reproduce and pass their characteristics on to their young.Know that overtime, inherited characteristics become more dominant within the population.Know that over a very long period of time, characteristics may be so different to how they were originally that a new species is created. This is evolution.Know that fossils give us evidence of what lived on the Earth millions of year ago and provide evidence to support the theory of evolution.Know that, more recently, scientists such as Darwin and Wallace observed how living things adapt to different environments to become distinct varieties with their own characteristics.Know how to use secondary sources to explain how fossils are explored to provide information about living things.Know how to understand that fossils provide information about living things that inhabited the Earth millions of years ago.Know that living things have changed over time, ways that they adapt to their environment and how this adaptation may lead to evolution. <p>Link Scientists: Charles Darwin , Mary Anning, Alfred Wallace</p>	<p>Biology: How are living things and their habitats similar/ different?</p> <ul style="list-style-type: none">Know that living things can be formally grouped according to characteristics.Know that plants and animals are two main groups but there are other livings things that do not fit into these groups e.g. micro-organisms such as bacteria and yeast, and toadstools and mushrooms.Know that plants can make their own food whereas animals cannot.Know that animals can be divided into three main groups: those that have backbones (vertebrates); and those that do not (invertebrates) (prior learning check) and micro-organisms. Vertebrates can be divided into five small groups: fish; amphibians; reptiles; birds; and mammals. Each group has common characteristics. Invertebrates can be divided into a number of groups, including insects, spiders, snails and worms. Micro-organisms can be divided into 4 main groups: fungi, moulds, bacteria, and Protista.Know that plants can be divided broadly into two main groups: flowering plants; and non-flowering plants.Know how to construct a classification key to classify a range of animals using broad groups (vertebrates / non-vertebrates / micro-organisms) and further sub-groups (insects, spiders, snails, worms, fish, amphibians, reptiles, birds, mammals, fungi, moulds, bacteria, and Protista) and give reasons for classifications made.Know how to classify a range of flowering and non-flowering plants.Know how to construct a classification key to classify flowering and non-flowering plants and give reasons for classifications chosen. <p>Link scientist: Carl Linneaus</p>		<p>Biology: How do the bodies of animals and humans work?</p> <ul style="list-style-type: none">Know that the heart pumps blood in the blood vessels around to the lungs.Know that oxygen goes into the blood and carbon dioxide is removed. The blood goes back to the heart and is then pumped around the body.Know that key features of the human circulatory system: nutrients, water and oxygen are transported in the blood to the muscles and other parts of the body where they are needed. As they are used, they produce carbon dioxide and other waste products. Carbon dioxide is carried by the blood back to the heart and then the cycle starts again as it is transported back to the lungs to be removed from the body.Know that diet, exercise, drugs and lifestyle have an impact on the way our bodies function. They can affect how well out heart and lungs work, how likely we are to suffer from conditions such as diabetes, how clearly we think, and generally how fit and well we feel. Some conditions are caused by deficiencies in our diet e.g. lack of vitaminsKnow the main parts of the human circulatory system: heart, lung, blood vessels, arteries, veins, capillaries, left atrium, right atrium, right ventricle, left ventricle, blood.Know the functions of the main parts of the circulatory system: heart, lung, blood vessels, arteries, veins, capillaries, left atrium, right atrium, right ventricle, left ventricle, blood.Know how nutrients and water are transported in animals and humans. <p>Link Scientist: Dr Daniel Hale Williams</p>