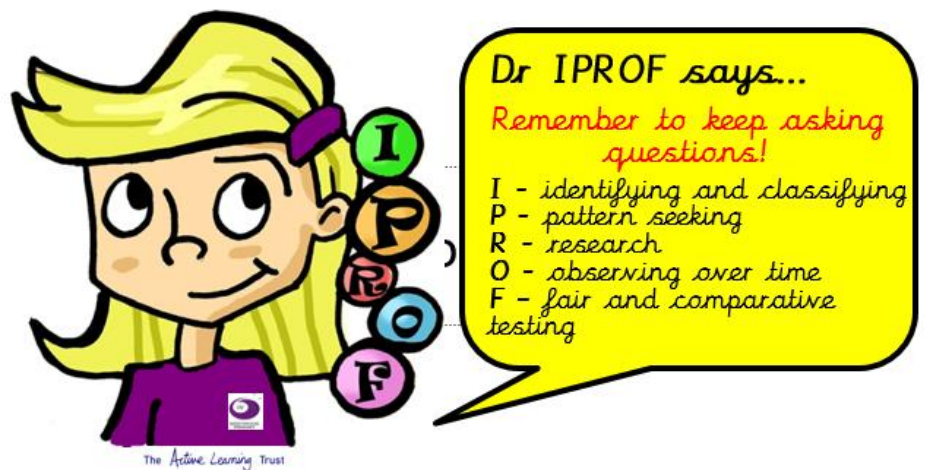
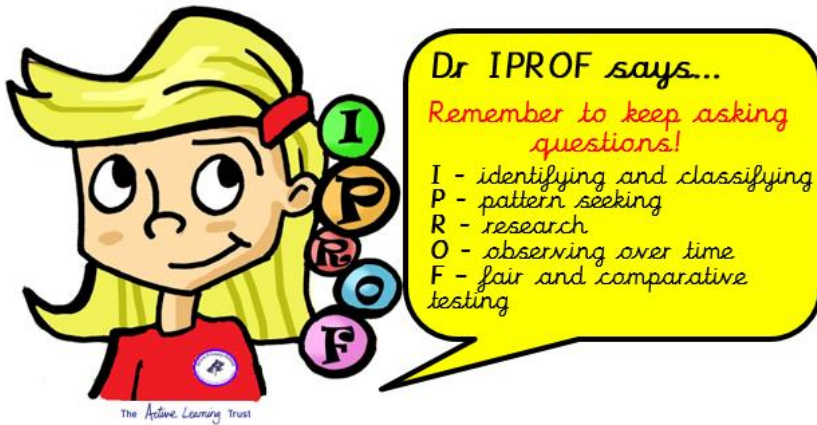


Science handbook



Updated 25.1.23

Key principles	Page 3
National Curriculum Statement	Page 4
Our Curriculum Offer	Page 7
Science curriculum Long Term Plan	Page 8
Planning flow diagram	Page 15
Progression of Skills, Knowledge and Technical Vocabulary	Page 16
Dr IPROF masters	Page 25
Non negotiables	Page 26
Recap and retrieval resources	Page 27
Planning resources	Page 29
Science and assessment in EYFS	Page 31
EYFS science resources	Page 32
Key vocabulary definitions	Page 33
Examples of comparative and fair tests	Page 34
Assessment document	Page 33

Our 5 key pillars

Within our science curriculum, we aim for each of our science sessions to support the children with the following five principles of their learning.

Pillars of 'good' science teaching



enquiry

questions

knowledge

purposeful

child led

Children develop knowledge and explore the world around them through 'I'PROF' scientific enquiry.

Children are able to conduct fair and comparative tests in a variety of scientific areas.

Children are inquisitive and can develop higher level thinking skills in order to answer scientific questions about the world around them.

Children are equipped with the knowledge and vocabulary to understand the uses and implications of science today and for the future.

Learning links to the real world and promotes future careers.

Children are given opportunities to lead their own investigations.

Children are stimulated and engaged in their learning.

National curriculum

The national curriculum (2014) for science states:

Within Key Stage 1 pupils should 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. **'Working scientifically' must always be taught** through and clearly related to the teaching of substantive science content in the programme of study.

Pupils should read and spell scientific vocabulary at a level consistent with their increasing word reading and spelling knowledge at key stage 1.

Below states the scientific enquiry skills that the national curriculum states children should be taught:

Statutory requirements

During years 1 and 2, pupils should be taught to use the following practical scientific methods, processes and skills through the teaching of the programme of study content:

- asking simple questions and recognising that they can be answered in different ways
- observing closely, using simple equipment
- performing simple tests
- identifying and classifying
- using their observations and ideas to suggest answers to questions
- gathering and recording data to help in answering questions.

Within lower Key Stage 2 pupils should **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.

'Working scientifically' must always be taught through and clearly related to substantive science content in the programme of study.

Pupils should read and spell scientific vocabulary correctly and with confidence, using their growing word reading and spelling knowledge.

Below states the scientific enquiry skills that the national curriculum states children should be taught:

Statutory requirements

During years 3 and 4, pupils should be taught to use the following practical scientific methods, processes and skills through the teaching of the programme of study content:

- asking relevant questions and using different types of scientific enquiries to answer them
- setting up simple practical enquiries, comparative and fair tests
- making systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers
- gathering, recording, classifying and presenting data in a variety of ways to help in answering questions
- recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables
- reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions
- using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions
- identifying differences, similarities or changes related to simple scientific ideas and processes
- using straightforward scientific evidence to answer questions or to support their findings.

Within upper Key Stage 2 pupils should have the opportunities 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**.

‘Working and thinking scientifically’ must always be taught through and clearly related to substantive science content in the programme of study.

Pupils should read, spell and pronounce scientific vocabulary correctly.

Below states the scientific enquiry skills that the national curriculum states children should be taught:

Statutory requirements

During years 5 and 6, pupils should be taught to use the following practical scientific methods, processes and skills through the teaching of the programme of study content:

- planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary
- taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate
- recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs
- using test results to make predictions to set up further comparative and fair tests
- reporting and presenting 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
- identifying scientific evidence that has been used to support or refute ideas or arguments.

Our Curriculum Offer

We pride ourselves on delivering a science curriculum which has been designed to increase our pupils knowledge and understanding of the world and enables all learners to acquire skills for later life. Science is taught discretely with a balanced focus of both knowledge and enquiry skills to ensure full coverage of the curriculum, which develops progression and is engaging pupils. Our science curriculum has been designed with the belief that science provides the foundations for the understanding of the world and has been mapped out in order to meet the objectives guided by the National Curriculum for Science (2014):

- 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.

To develop both knowledge and working scientifically skills, which will equip pupils for future careers, children creatively take on roles of scientists, which encourages a sense of curiosity and excitement about the natural world. This is because we believe science should be delivered in a creative, active ways, which allow children to take ownership over their learning and provide wider links to other subjects within the curriculum, and children are encouraged to 'Think like scientists'. Therefore, we provide the children with opportunities for awe and wonder around the skill through creative displays, extracurricular activities and giving the children opportunities to experience science trips as well as visits from outside agencies.

The planning of learning always takes place with a set knowledge and working scientifically skill of which the delivery is planned using a range of up to date resources and activities, which allow children to develop as independent learners. As a staff and pupil team, we have created 5 top principles of which we believe are important to have in each science lesson, teachers plan to ensure that these are present in all sessions delivered. Staff are encouraged as a group to develop their own subject knowledge surrounding each topic to ensure high quality delivery of learning.

During lessons, scientists are exposed to high quality scientific vocabulary which is linked through all areas of the curriculum and includes the vocabulary required to understand the working scientifically skills. Scientists are familiar with our science-learning hero DR IPROF, this acronym is used to break down the working scientifically skills and scaffold these for children's understanding. Scientists are encouraged to use their working scientifically skills within each session in order to develop as scientists.

To assess children's learning within the Science curriculum, teachers use their professional judgements to assess which children are secure in the expected learning in each half termly topic. To aid this assessment we use a range of tools to support judgements; Chris Quigley's milestones, ASE plan it examples and TAPS assessment grids.



Grove and Westwood Science Curriculum Overview



Key stage 1	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
Cycle A	My family history	food glorious food	Victorian Childhood	Down under and beyond	Where in the world	Greatest inventions
Knowledge	<p>Animals including humans S10: identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense. S19: notice that animals, including humans, have offspring which grow into adults (<u>through lifecycle of a human</u>)</p> <p>S21: describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene.</p>	<p>Living things and their habitats S14: 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 plants, and how they depend on each other S15: identify and name a variety of plants in their habitats, including micro-habitats</p> <p>S13: explore and compare the differences between things that are living, dead, and things that have never been alive</p>	<p>Uses of everyday materials S2: identify and name a variety of everyday materials, including wood, plastic, glass, metal, water, and rock</p> <p>S22: identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses</p> <p>(Comparing Victorian toys to modern & making own Victorian toy)</p>	<p>seasonal changes S5: observe changes across the four seasons S6: observe and describe weather associated with the seasons and how day length varies.</p>	<p>Living things and their habitats S8: identify and name a variety of common animals that are carnivores, herbivores and omnivores</p> <p>S15: identify and name a variety of plants and animals in their habitats, including micro-habitats</p>	<p>Uses of everyday materials S22: identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses S23: find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching.</p>
Working Scientifically	To identify and classify	To explore patterns, seek to find the answers to simple questions.	To identify and classify	To use observations and ideas to help answer questions.	To research and gather data to answer to simple questions.	To set up a simple investigation and show

						findings in simple charts. Fair and comparative testing
	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
Cycle B	What it is like where we live	What are seasons?	The great fire of London	Mary Seacole & Florence Nightingale	Local heroes	What are the wonders of our world?
Knowledge objectives	<p>Plants S12: identify and describe the basic structure of a variety of common flowering plants, including trees. S17: observe and describe how seeds and bulbs grow into mature plants (growing fruits/veg)</p> <p>S18: find out and describe how plants need water, light and a suitable temperature to grow and stay healthy.</p>	<p>Plants S11: identify and name a variety of common wild and garden plants, including deciduous and evergreen trees (plants in the local environment)</p> <p>S12: identify and describe the basic structure of a variety of common flowering plants, including trees.</p>	<p>Everyday materials S2: identify and name a variety of everyday materials, including wood, plastic, glass, metal, water, and rock</p> <p>S3: describe the simple physical properties of a variety of everyday materials</p>	<p>Everyday materials S1: distinguish between an object and the material from which it is made based on their simple physical properties.</p> <p>S4: compare and group together a variety of everyday materials</p>	<p>Animals including humans S7: identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals S9: describe and compare the structure of a variety of common animals (fish, amphibians, reptiles, birds and mammals, including pets) identifying and classifying S20: :find out about and describe the basic needs of animals, including humans, for survival (water, food and air)</p>	<p>Living things and their habitats S14: :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 how they depend on each other</p> <p>S15: identify and name a variety of animals in their habitats, including micro-habitats</p> <p>S16: 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.</p>
Working Scientifically	To set up simple comparative investigations Fair and comparative testing	To use observations and ideas to help answer questions.	To research to gather and record data to help in answering questions.	To identify and classify	To explore patterns, seek to find the answers to simple questions.	To investigate to find answers to questions.

Lower key stage 2	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
--------------------------	-----------------	-----------------	-----------------	-----------------	-----------------	-----------------

Cycle A	The Americas	Our local area	Rivers and Water cycle	Crime and Punishment	Earthquakes and Volcanoes	Romans
Knowledge	<p>States of matter S27: compare and group materials together, according to whether they are solids, liquids or gases</p> <p>S28: observe that some materials change state when they are heated or cooled, and measure or research the temperature at which this happens in degrees Celsius (°C)</p> <p>S29: identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature.</p>	<p>Animals, including humans S24: describe the simple functions of the basic parts of the digestive system in humans</p> <p>S25: identify the different types of teeth in humans and their simple functions</p>	<p>Sound S30: identify how sounds are made, associating some of them with something vibrating S32: find patterns between the pitch of a sound and features of the object that produced it S31: recognise that vibrations from sounds travel through a medium to the ear S33: find patterns between the volume of a sound and the strength of the vibrations that produced it S34: recognise that sounds get fainter as the distance from the sound source increases.</p>	<p>Electricity S35: identify common appliances that run on electricity S36: construct a simple series electrical circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers S37: identify whether or not a lamp will light in a simple series circuit, based on whether or not the lamp is part of a complete loop with a battery S38: recognise that a switch opens and closes a circuit and associate this with whether or not a lamp lights in a simple series circuits S39: recognise some common conductors and insulators, and associate metals with being good conductors.</p>	<p>Forces and Magnets S15: compare how things move on different surfaces</p> <p>S16: notice that some forces need contact between two objects, but magnetic forces can act at a distance</p>	<p>Animals, including humans S9: 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 S10: identify that humans and some other animals have skeletons and muscles for support, protection and movement</p> <p>S26: construct and interpret a variety of food chains, identifying producers, predators and prey.</p>
Working Scientifically	To ask relevant questions and using different types of scientific enquiries to answer them. ie. observations and investigations	To identify differences, similarities or changes related to simple scientific ideas and processes	To set up comparative and fair investigation recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables	To set up comparative and fair investigation.	To research and report on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions	To use systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers

Cycle B	Our world	Ancient Egyptians	Climate & Weather	The stone age	Bronze Age & Iron Age	Coasts
Knowledge	<p>Plants S11: identify and describe the functions of different parts of flowering plants: roots, stem/trunk, leaves and flowers S12: explore the requirements of plants for life and growth (air, light, water, nutrients from soil, and room to grow) and how they vary from plant to plant</p>	<p>Plants S13: investigate the way in which water is transported within plants S14: explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal.</p>	<p>Living Things and their Habitats S21: recognise that living things can be grouped in a variety of ways S22: explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment S23: recognise that environments can change and that this can sometimes pose dangers to living things.</p>	<p>Rocks S6: compare and group together different kinds of rocks on the basis of their appearance and simple physical properties S7: describe in simple terms how fossils are formed when things that have lived are trapped within rock S8: recognise that soils are made from rocks and organic matter.</p>	<p>Light S1: recognise that they need light in order to see things and that dark is the absence of light S2: notice that light is reflected from surfaces S3: recognise that light from the sun can be dangerous and that there are ways to protect their eyes S4: recognise that shadows are formed when the light from a light source is blocked by a solid object S5: find patterns in the way that the size of shadows change.</p>	<p>Forces and Magnets S17: observe how magnets attract or repel each other and attract some materials and not others S18: compare and group together a variety of everyday materials on the basis of whether they are attracted to a magnet, and identify some magnetic materials. S19: describe magnets as having two poles. S20: predict whether two magnets will attract or repel each other, depending on which poles are facing.</p>
Working Scientifically	To spot patterns and gather, record and present data in a variety of ways to help in answering questions	TO use observations to draw simple conclusions, make predictions for new values	To identify differences, similarities or changes related to simple scientific ideas and processes	To research and use straightforward scientific evidence to answer questions or to support their findings	.SW6: recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables SW7: reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions	To up comparative and fair investigation recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables

Upper key stage 2	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
Cycle A	Protecting the environment	War and its impact	Journeys	Ancient Greeks	Our world in the future	Alpine regions
Knowledge	<p>Properties and changes of materials</p> <p>To know that some materials will dissolve in liquid to form a solution, and describe how to recover a substance from a solution</p> <p>Revisit: To know that melting and dissolving are different processes.</p> <p>To use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating.</p> <p>To understand that dissolving, mixing and changes of state are reversible changes</p> <p>To understand and explain that some changes result in the formation of new materials, and that this kind of change is not usually reversible.</p> <p>To know changes associated</p>	<p>Properties and changes of materials</p> <p>Revisit: To know how different materials respond to magnets.</p> <p>To give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials including wood, metals and plastics.</p> <p>To compare and group together everyday materials on the basis of their properties, including their hardness, solubility, transparency, conductivity (electrical and thermal), and response to magnets.</p>	<p>Living things and their habitats.</p> <p>To describe how living things are classified into broad groups according to common observable characteristics, similarities and differences. (microorganisms, plants and animals)</p> <p>To give reasons for classifying plants and animals based on specific characteristics.</p> <p>To understand the life process of reproduction in some plants and animals.</p> <ul style="list-style-type: none"> revisit flowering and non flowering 	<p>Forces</p> <p>To explain that unsupported objects fall towards the Earth because of the force of gravity. (that acts between the Earth and the falling object)</p> <p>To identify the effects of air resistance, water resistance and friction, that act between moving surfaces.</p> <p>To recognise that some mechanisms allow a smaller force to have a greater effect. (e.g. including levers, pulleys and gears)</p>	<p>Earth and Space</p> <p>To describe the movement of the Earth, and other planets, relative to the Sun in the solar system.</p> <p>To describe the movement of the Moon relative to the Earth.</p> <p>To use the idea of the Earth's rotation to explain day and night and the apparent movement of the sun across the sky.</p> <p>Taught through PSHE: To know the changes experienced in puberty.</p>	<p>Earth and Space</p> <p>To describe the Sun, Earth and Moon as approximately spherical bodies.</p> <p>To know that the Sun is a star at the centre of our solar system and that it has eight planets.</p>

	with burning and the action of acid on bicarbonate of soda.					
Working Scientifically	To plan different types of scientific investigations to answer questions, including recognising and controlling variables where necessary	To make systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs	To use test results from investigations to make predictions to set up further comparative and fair tests	To set up investigations and take measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate	To identify scientific evidence through research that has been used to support or refute ideas or arguments.	To identify scientific evidence that has been used to support or refute ideas or arguments.
Cycle B	Africa	Saxons	Vikings	Changes in our environment	The Mayan Civilisation	South America: The Amazon
Knowledge	<p>Evolution and inheritance To recognise that living things have changed over time. (i.e. that fossils provide information about living things that inhabited the Earth millions of years ago)</p> <p>To recognise living things produce offspring of the same kind. (note: normally offspring vary and are not identical to their parents)</p> <p>To identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution.</p>	<p>Living things & their habitats</p> <p>To describe the changes as humans develop to old age.</p> <p>To understand the differences in the life cycles of a mammal, amphibian, an insect and a bird</p> <p>To understand the life process of reproduction in some plants and animals.</p> <ul style="list-style-type: none"> revisit flowering and non flowering 	<p>Light To recognise that light appears to travel in straight lines.</p> <p>To 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.</p> <p>To 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.</p> <p>To use the idea that light travels in straight lines and use this to explain why shadows have the same shape as the objects that cast them.</p>	<p>Electricity To know the effect of the number and voltage of cells used in the circuit on the brightness of a lamp or the volume of a buzzer.</p> <p>To compare and give reasons for variations in how components function. (i.e. the brightness of bulbs, the loudness of buzzers and the on/off position of switches)</p> <p>To recognise the symbols when representing a simple circuit in a diagram.</p>	<p>Animals including humans To know the main parts of the human circulatory system.</p> <p>To describe the functions of the heart, blood vessels and blood .</p> <p>To recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function.</p> <p>To know the stages of growth and development in humans and record this on a timeline.</p> <p>To describe the ways in which nutrients and water are transported within animals, including humans.</p>	<p>Working scientifically skills focus To plan different types of scientific investigations to answer questions, including recognising and controlling variables where necessary.</p> <p>To carry out investigations, taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate.</p> <p>To record data and results collected during investigations of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs</p> <p>To use results from investigations to make predictions to set up further comparative and fair investigations.</p> <p>To use research to report and present</p>

						<p>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.</p> <p>To identify scientific evidence that has been used to support or refute ideas or arguments.</p> <p><u>Taught through PSHE: To know the changes experienced in puberty.</u></p>
Working Scientifically	To research and identify, scientific evidence that has been used to support or refute ideas or arguments.	To use test results from investigations to make predictions to set up further comparative and fair investigations	To planning different types of scientific investigations to answer questions, including recognising and controlling variables where necessary	To plan different types of scientific investigations to answer questions, including recognising and controlling variables where necessary	To research, 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	All above

Planning flow chart

1

Use science curriculum overview to find topic and taught knowledge and enquiry skills.

2

Match up specific taught enquiry skills which a best fit knowledge skill.

3

Use **science knowledge and skills document** to find broken down objectives and vocabulary

4

Use **ASE assessment** documents to view examples statements for a 'secure' end of topic assessment.

Reference **Chris Quigley milestones** for topic to see example breakdowns and outcomes.

5

Use support resources to plan activities to fit working scientifically and knowledge objectives.

Switched on science (drive)

Developing experts

Chris Quigley milestones (drive)

ASE plan (drive)

6

Match a working scientifically skill with each knowledge objective to be explored or specifically taught in each lesson.

Lesson parts

7
Create a glossary for each session using planned vocab.

Plan in retrieval activities to interleave prior learning. See page ...

Use these websites for useful resources within lessons ...
<https://www.ogdentrust.com/resources-cpd/resources?type=&age=&series=phizzi-practicals>
<https://explorify.wellcome.ac.uk/>
<https://padlet.com/dashboard>
<https://kahoot.com/>
<https://www.ase.org.uk/plan>
<https://www.stem.org.uk/primary-science>

8

Any other support or questions please ask a member of the Science team.
Beth, Kate or Amber

Knowledge and skills progression

Curriculum Programme					
	Learning Objective	Knowledge (National Curriculum)	Skills	Technical Vocabulary	
End of KS1	Biology	To understand plants	<p>To know the names variety of common wild and garden plants, including deciduous and evergreen tree</p> <p>To know the basic structure of a variety of common flowering plants, including trees</p> <p>To understand how seeds and bulbs grow into mature plants</p> <p>To understand how plants need water, light and a suitable temperature to grow and stay healthy</p>	<p>To observe and record, with some accuracy, the growth of a variety of plants as they change over time from a seed or bulb.</p> <p>To observe similar plants at different stages of growth.</p> <p>To investigate that plants need light and water to stay healthy.</p> <p>To observe closely, compare and contrast familiar plants.</p> <p>To describe how plants can be identified and grouped.</p> <p>To research and draw diagrams showing the parts of different plants including trees.</p> <p>To record how plants have changed over time.</p>	<p>Deciduous, Evergreen,</p> <p>leaf, flower, blossom petal, fruit, root, bulb, seed, trunk, branches, stem, berry, bark, stalk, bud</p> <p>Light, shade, sun, warm, cool, water, grow, healthy</p>
		To understand animals and human	<p>To know the names of a variety of common animals including fish, amphibians, reptiles, birds and mammals including pets.</p> <p>To know the names of a variety of common animals that are carnivores, herbivores and omnivores</p> <p>To know the names of the basic parts of the human body and say which part of the body is associated with each sense</p> <p>To understand that animals including humans, have offspring which grow into adults</p> <p>To know the basic needs of animals, including humans, for survival (water, food and air)</p>	<p>To identify and classify a variety of animals that are birds, fish, amphibians, reptiles, mammals and invertebrates.</p> <p>To identify and compare the structure of common animals.</p> <p>To identify, name, draw and label parts of the body.</p> <p>To observe, compare and contrast animals.</p> <p>To identify and group animals according to what they eat.</p> <p>To investigate using their senses to compare different textures, sounds and smells.</p> <p>To observe and compare changes in humans and animals over time.</p> <p>To investigate and describe the basic needs of animals.</p>	<p>fish, amphibians, reptiles, birds and mammals, tail, wing, claw, fin, scales, feathers, paw, beak, fur, hooves</p> <p>head, body, neck, arms, elbows, legs, knees, face, ears, eyes, hair, mouth, teeth</p> <p>baby, toddler, child, teenager, adult</p>

		To understand humans of exercise, eating the right amounts of different types of food, and hygiene		
	To investigate living things and their habitats	<p>To know the differences between things that are living, dead, and things that have never been alive</p> <p>To understand that most living things live in habitats to which they are suited.</p> <p>To understand how different habitats, provide for the basic needs of different kinds of animals and plants, and how they depend on each other</p> <p>To know the names of a variety of plants and animals in their habitats, including microhabitats</p> <p>To know how animals, obtain their food from plants and other animals.</p> <p>To understand a simple food chain, and identify and name different sources of food.</p>	<p>To observe how different animals, including humans, grow</p> <p>To research what things animals need for survival and what humans need to stay healthy</p> <p>To identify and classify things according to whether they are living, dead or were never alive.</p> <p>To investigate a question and record their findings using charts.</p> <p>To research, describe and explain their decisions linked to their knowledge.</p> <p>To research and find out about the conditions in different habitats and microhabitats.</p>	<p>habitat, microhabitat seashore, woodland, ocean, rainforest</p> <p>egg, chick, chicken; egg, caterpillar, pupa, living, dead, never been alive, suited, suitable, basic needs, food, food chain, shelter, move, feed</p> <p>Names of areas in local habitats: Pond, woodland, logs, bushes etc</p>
Chemistry	To investigate materials	<p>To know the differences between an object and the material from which it is made</p> <p>To know the names of a variety of everyday materials, including wood, plastic, glass, metal, water, and rock</p> <p>To know the simple physical properties of a variety of everyday materials</p> <p>To know the names of and be able to group variety of everyday materials on the basis of their simple physical properties</p> <p>To know the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses</p> <p>To understand how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching</p>	<p>To compare the uses of everyday materials</p> <p>To observe closely, identify and classify the uses of different materials.</p> <p>To investigate and record their observations in a variety of ways.</p> <p>To perform simple investigations to explore questions.</p>	<p>object, material, brick, paper, fabrics, elastic, foil, wood, plastic, glass, metal, elastic, foil, card, cardboard, rubber, wool, clay, rock</p> <p>hard/soft; stretchy/stiff; shiny/dull; rough/smooth; bendy/floppy; waterproof/absorbent; breaks, tears, rough, smooth, shiny, dull, suitable/unsuitable, use/useful, rigid/flexible, strong/weak, rough/smooth, transparent/opaque,</p> <p>shape, push/pushing, pull/pulling, twist/twisting, squash/squashing, bend/bending, stretch/stretching.</p>

	Physics	To understand weather and seasonal changes	<p>To understand changes across the 4 seasons</p> <p>To know that weather is associated with the seasons and how day length varies</p>	<p>To make tables, charts and displays about the weather and what happens in the world around them.</p>	<p>Sunny, rainy, windy, snowy, winter, summer, spring, autumn, sun, sunrise, sun set, day length</p>
End of LKS2	Biology	To understand plants	<p>To know the functions of different parts of flowering plants.</p> <p>To know that plants need air, water, nutrients from soil, light and room to grow and that this varies from plant to plant.</p> <p>To understand the requirements of plants for life and growth and how these vary from plant to plant.</p> <p>To know how water is transported in plants.</p> <p>To understand the role of flowers in the life cycle of flowering plants including pollination, seed formation and seed dispersal.</p>	<p>To investigate the effect of different factors on plant growth e.g. fertiliser, sunlight.</p> <p>To spot patterns in the structure of fruits that relate to how the seeds are dispersed.</p> <p>To observe how water is transported in plants. (e.g. by putting cut, white carnations into coloured water)</p> <p>To observe how water travels up the stem to the flowers.</p> <p>To investigate questions around the role of the roots and stem in nutrition and support of a plants lifecycle. (e.g. leaves for nutrition and flowers for reproduction.</p>	<p>Photosynthesis, pollen, insect/wind pollination, seed formation, seed dispersal – wind dispersal, animal dispersal, water dispersal, roots, leaf, flower, stem, nutrition</p>
		To understand animals and human	<p>To know that animals, including humans, need the right types and amount of nutrition, and that they cannot make their own food and they get nutrition from what they eat.</p> <p>To know humans and some other animals have skeletons and muscles for support, protection and movement.</p> <p>To understand the simple functions of the basic parts of the digestive system in humans</p> <p>To know the different types of teeth in humans and their simple functions</p> <p>To understand variety of food chains including understanding the role of producers, predators and prey</p> <p>To know parts of the body have special functions</p>	<p>To identify and classify animals with and without skeletons.</p> <p>To observe and compare animal's movement; exploring ideas about what would happen if humans did not have skeletons.</p> <p>To identify and compare the diets of different animals (including their pets) and decide ways of grouping them according to what they eat.</p> <p>To research different food groups and how they keep us healthy by designing meals based on what they find out.</p> <p>To research the main body parts associated with the digestive system.</p>	<p>Digestive system, digestion, mouth, teeth, tongue, saliva, oesophagus, stomach, small intestine, nutrients, large intestine, rectum, anus, teeth, incisor, canine, molar, herbivore, carnivore, omnivore, muscles</p>
		To investigate living things	<p>To know living things can be grouped in a variety of ways</p> <p>To understand classification keys and use these to help group, identify and name a variety of living things in their local and wider environment</p> <p>To understand environments can change and that this can sometimes pose dangers to living things.</p>	<p>To identify and classify local plants and animals using simple guides or keys</p> <p>To observe animals in their habitats and use what they have found out to answer and ask questions.</p> <p>To research the human impact (both positive and negative) on environments. (e.g. the positive effects of nature reserves, ecologically planned parks, or garden ponds, and the negative effects of population and development, litter or deforestation)</p> <p>To identify and research plants and animals in their habitat.</p> <p>To observe how the habitat changes throughout the year.</p>	<p>Classification, classification keys, environment, habitat, human impact, positive, negative, migrate, hibernate, vertebrate, invertebrate, fish, amphibians, reptiles, birds, mammals, snail, slug, worm, spider, insect</p>

				To identify and classify a range of living things that include animals and flowering plants and non-flowering plants. (e.g. vertebrate animals into groups such as fish, amphibians, reptiles, birds, and mammals; and invertebrates into snails and slugs, worms, spiders, and insects)	
Chemistry	To investigate materials (rocks and soils)	To know different kinds of rocks can be grouped on the basis of their appearance and simple physical properties To understand in simple terms how fossils are formed when things that have lived are trapped within rock To know that soils are made from rocks and organic matter.	To research different rocks, including those used in buildings and gravestones and in the local environment. To research how and why rocks might have changed over time. To use a hand lens or microscope to help them to identify and classify rocks according to whether they have grains or crystals, and whether they have fossils in them. To research and discuss the different kinds of living things whose fossils are found in sedimentary rock and explore how fossils are formed. To investigate different soils in order to identify similarities and differences between them To investigate what happens when rocks are rubbed together and what changes occur when they are in water. To use research to raise and answer questions about the way soils are formed	Rock, stone, pebble, boulder, grain, crystals, layers, hard, soft, texture, absorb water, soil, fossil, marble, chalk, granite, sandstone, slate, soil, peat, sandy/chalk/clay soil	
	To investigate materials (states of matter)	To know materials can be grouped together according to whether they are solids, liquids or gases To understand that some materials change state when they are heated or cooled. To know the temperature at which this happens in degrees Celsius (°C) To know the role of evaporation and condensation in the water cycle and associate the rate of evaporation with temperature.	To identify and classify a variety of everyday materials to create simple descriptions. (e.g. solids hold their shape; liquids form a pool not a pile; gases escape from an unsealed container) To investigate the effect of temperature on substances such as chocolate, butter, cream. (e.g. to make food such as chocolate crispy cakes and ice-cream for a party). To research the temperature at which materials change state. (e.g. when iron melts or when oxygen condenses into a liquid) To observe and record evaporation over a period of time. (E.g. a puddle in the playground or washing on a line) To investigate the effect of temperature on materials. (E.g. on washing drying or snowmen melting) To observe water as a solid, a liquid and a gas and investigate the changes to water when it is heated or cooled.	Solid, liquid, gas, state change, melting, freezing, melting point, boiling point, evaporation, temperature, water cycle	
Physics	To understand movement, forces and magnets	To know how things move on different surfaces To understand that some forces need contact between two objects, but magnetic forces can act at a distance	To identify and classify how different things move. To investigate how far things move on different surfaces, raising questions based on what they have found out.	Force, push, pull, twist, contact force, non-contact force, magnetic force, magnet, strength, bar magnet, ring magnet, button magnet, horseshoe magnet, attract, repel, magnetic material, metal, iron, steel, poles, north pole, south pole	

		<p>To know how magnets attract or repel each other and attract some materials and not others</p> <p>To know a variety of everyday materials can be grouped and compared on the basis of whether they are attracted to a magnet, and identify some magnetic materials</p> <p>To know magnets as having two poles.</p> <p>To understand predict whether two magnets will attract or repel each other, depending on which poles are facing.</p>	<p>To research, gather and record data to find answers their own questions.</p> <p>To investigate the strengths of different magnets and find a fair way to compare them.</p> <p>To classify materials into those that are magnetic and those that are not.</p> <p>To spot patterns in the way that magnets behave in relation to each other and what might affect this. (e.g. the strength of the magnet or which pole faces another)</p> <p>To identify magnets are useful in everyday items and suggest creative uses for different magnets.</p> <p>To investigate the behaviour and everyday uses of different magnets. (e.g. bar, ring, button and horseshoe)</p>	
	To understand light and seeing	<p>To understand that they need light in order to see things and that dark is the absence of light</p> <p>To know that light is reflected from surfaces.</p> <p>To understand and describe that light from the sun can be dangerous and that there are ways to protect their eyes.</p> <p>To understand how shadows are formed and what might cause these to change.</p> <p>To know how the size of shadows change.</p>	<p>To spot patterns in what happens to shadows when the light source moves or the distance between the light source and the object changes.</p> <p>To investigate and measure what happens to shadows when the light source moves or the distance between the light source and the object changes.</p> <p>To investigate that shadows are formed when the light from a light source is blocked by an opaque object</p> <p>To investigate what happens when light reflects. (e.g. off a mirror or other reflective surfaces, including playing mirror game)</p> <p>To use knowledge to answer questions about how light behaves.</p>	<p>Light, Light source, Dark, Absence of light, Transparent, Translucent, Opaque, Shiny, Matt, Surface, Shadow, Reflect, Mirror, Sunlight, Dangerous</p>
	To investigate sound and hearing	<p>To understand how sounds are made, associating some of them with something vibrating</p> <p>To understand recognise that vibrations from sounds travel through a medium to the ear</p> <p>To know the pitch of a sound and features of the object that produced it can differ</p> <p>To know the volume of a sound and the strength of the vibrations that produced it can differ</p> <p>To understand that sounds get fainter as the distance from the sound source increases.</p>	<p>To spot patterns in the sounds that are made by different object. (e.g. saucepan lids of different sizes or elastic bands of different thicknesses)</p> <p>To investigate which provides the best insulation against sound. (e.g. make earmuffs from a variety of different materials to investigate.)</p> <p>To use research and what they have found out to make and play their own instruments.</p> <p>To identify the way sound is made through vibration in a range of different musical instruments from around the world.</p> <p>To investigate how the pitch and volume of sounds can be changed in a variety of ways.</p>	<p>sound, source, vibrate, vibration, travel, pitch (high, low), volume, faint, loud, insulation</p>
	To understand electrical circuits	<p>To know appliances that run on electricity</p> <p>To understand a simple series electrical circuit.</p> <p>To know the names of the basic parts of a simple circuit.</p>	<p>To observe and spot patterns in simple circuits. (e.g. bulbs get brighter if more cells are added.)</p> <p>To investigate conductors and insulators. (e.g. that metals tend to be conductors of electricity, and that some materials can and</p>	<p>Electricity, electrical appliance/device, mains, plug, electrical circuit, complete circuit, component, cell, battery, positive, negative, connect/connections, loose connection, short circuit, crocodile clip, bulb, switch, buzzer, motor, conductor, insulator, metal, non-metal, symbol</p>

			<p>To know whether or not a lamp will light in a simple series circuit.</p> <p>To understand the term ‘complete loop’ circuit.</p> <p>To understand the role of a switch in a simple circuit.</p> <p>To know some common conductors and insulators, and know metals are good conductors.</p>	<p>some cannot be used to connect across a gap in a circuit.)</p> <p>To test and draw pictorial representations of simple series circuits. (e.g. trying different components; bulbs, buzzers and motors, and including switches, and use their circuits to create simple devices)</p>	<p>cells, wires, bulbs, switches and buzzers</p>
End of UKS2	Biology	To understand animals and human	<p>To understand the changes as humans develop to old age.</p> <p>To know the stages of growth and development in humans and record this on a timeline.</p> <p>To know the changes experienced in puberty.</p> <p>To know the main parts of the human circulatory system.</p> <p>To know the functions of the heart, blood vessels and blood .</p> <p>To know the impact of diet, exercise, drugs and lifestyle on the way their bodies function.</p> <p>To understand the ways in which nutrients and water are transported within animals, including humans.</p> <p>To know how to keep their bodies healthy and how their bodies might be damaged.</p> <p>To know how some drugs and other substances can be harmful to the human body.</p> <p>To understand how the circulatory system enables the body to function.</p>	<p>To research the gestation periods of other animals and comparing them with humans. (e.g. by finding out and recording the length and mass of a baby as it grows)</p> <p>To research the work of scientists and scientific research about the relationship between diet, exercise, drugs, lifestyle and health.</p>	<p>Puberty, Physical changes, Emotional changes, Moods, Menstruation, Periods, Tampons, Sanitary towels, Wet dreams , Semen, Erection, Sweat, Breasts, Spots, Pubic hair, Facial hair, Underarm hair,, Womb, Sperm, Egg, Conception, Fertilisation, Pregnancy, Sexual intercourse ,</p> <p>Twins, Fostering, Adoption, Relationship ,Friendship, Love, Consent, Intimacy, Sexual feelings, Privacy Human rights, Protection, Female Genital, Mutilation</p> <p>Heart, pulse, rate, pumps, blood, blood vessels, transported, lungs, oxygen, carbon dioxide, nutrients, water, muscles, cycle, circulatory system, diet, exercise, drugs and lifestyle</p>
		To investigate living things	<p>To understand the differences in the life cycles of a mammal, amphibian, an insect and a bird</p> <p>To understand the life process of reproduction in some plants and animals.</p> <p>To understand how living things are classified into broad groups according to common observable characteristics, similarities and differences. (microorganisms, plants and animals)</p> <p>To know and give reasons for classifying plants and animals based on specific characteristics.</p>	<p>To identify and classify animals into commonly found invertebrates and vertebrates. (insects, spiders, snails, worms, fish, amphibians, reptiles, birds and mammals).</p> <p>To research and raise questions about their local environment throughout the year</p> <p>To observe life-cycle changes in a variety of living things (e.g. plants in the vegetable garden or flower border, and animals in the local environment)</p> <p>To research the work of naturalists, animal behaviourists and pioneers (e.g. David Attenborough, Jane Goodall and Carl Linnaeus, a pioneer of classification.)</p>	<p>Vertebrates, fish, amphibians, reptiles, birds, mammals, invertebrates, insects, spiders, snails, worms, flowering and non-flowering</p>

			<p>To research different types of reproduction. (including sexual and asexual reproduction in plants, and sexual reproduction in animals)</p> <p>To observe and compare the life cycles of plants and animals in their local environment with other plants and animals around the world. (e.g.in the rainforest, in the oceans, in desert areas and in prehistoric times)</p> <p>To ask pertinent questions and suggesting reasons for similarities and differences about plants around the world.</p> <p>To test growing new plants from different parts of the parent plant. (e.g. seeds, stem and root cuttings, tubers, bulbs)</p> <p>To observe changes in an animal over a period of time (e.g.by hatching and rearing chicks).</p> <p>To research and compare how different animals reproduce and grow.</p> <p>To identify some animals and plants in the immediate environment using classification systems and keys.</p> <p>To research unfamiliar animals and plants from a broad range of other habitats and decide where they belong in the classification system</p>	
	To understand evolution and inheritance	<p>To know that living things have changed over time. (i.e.that fossils provide information about living things that inhabited the Earth millions of years ago)</p> <p>To know living things produce offspring of the same kind. (note: normally offspring vary and are not identical to their parents)</p> <p>To understand how animals and plants are adapted to suit their environment in different ways.</p> <p>To know adaptation may lead to evolution.</p>	<p>To research how living things on earth have changed over time</p> <p>To research the idea of characteristics in evolution. (i.e. passed from parents to their offspring by considering different breeds of dogs, and what happens when. e.g.labradors are crossed with poodles)</p> <p>To research variation in offspring over time. (i.e can make animals more or less able to survive in particular environments, e.g. by exploring how giraffes' necks got longer, or the development of insulating fur on the arctic fox)</p> <p>To research the work of palaeontologists. (e.g. Mary Anning and about how Charles Darwin and Alfred Wallace developed their ideas on evolution)</p>	<p>Offspring, sexual reproduction, vary, characteristics, suited, adapted, environment, inherited, species, fossils</p>
Chemistry	To investigate materials	<p>To know everyday materials can be grouped on the basis of their properties.</p> <p>To know how different materials respond to magnets.</p> <p>To know that some materials will dissolve in liquid to form a solution, and describe how to recover a substance from a solution</p> <p>To know that melting and dissolving are different processes.</p>	<p>To investigate and compare the properties of a broad range of materials. (including relating to magnetism and electricity)</p> <p>To investigate reversible changes. (Including evaporating, filtering, sieving, melting and dissolving.)</p> <p>To investigate changes that are difficult to reverse. (e.g. burning, rusting and other reactions; vinegar with bicarbonate of soda)</p> <p>To research how chemists create new materials. (e.g. Spencer Silver, who invented</p>	<p>Thermal/electrical insulator/conductor, change of state, mixture, dissolve, solution, soluble, insoluble, filter, sieve reversible/non-reversible change, burning, rusting, new material</p>

		<p>To understand solids, liquids and gases to decide how mixtures might be separated.</p> <p>To know reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials.</p> <p>To understand that dissolving, mixing and changes of state are reversible changes</p> <p>To understand and explain that some changes result in the formation of new materials, and that this kind of change is not usually reversible.</p> <p>To know changes associated with burning and the action of acid on bicarbonate of soda.</p>	<p>the glue for sticky notes or Ruth Benerito, who invented wrinkle-free cotton)</p> <p>To observe that some conductors will behave differently in electrical circuits. (e.g. produce a brighter bulb in a circuit than others and that some materials will feel hotter than others when a heat source is placed against them)</p> <p>To investigate answers to questions (e.g. 'Which materials would be the most effective for making a warm jacket, for wrapping ice cream to stop it melting, or for making blackout curtains?')</p> <p>To identify and compare materials in order to make a switch in a circuit.</p> <p>To observe and compare the changes that take place in materials (e.g. when burning different materials or baking bread or cakes.)</p> <p>To research and discuss how chemical changes have an impact on our lives (e.g. cooking)</p> <p>To research and discuss the creative use of new materials. (such as polymers, super-sticky and super-thin materials)</p>	
Physics	<p>To understand movement, forces and magnets</p> <p>Forces</p>	<p>To understand that unsupported objects fall towards the Earth because of the force of gravity. (that acts between the Earth and the falling object)</p> <p>To understand the effects of air resistance, water resistance and friction, that act between moving surfaces.</p> <p>To know that some mechanisms allow a smaller force to have a greater effect. (e.g. including levers, pulleys and gears)</p>	<p>To investigate, using a fair test, falling objects and raise my own questions using the results. (e.g. falling paper cones or cup-cake cases, making a range of parachutes)</p> <p>To observe how different objects fall. (parachutes and sycamore seeds)</p> <p>To investigate resistance in water, (e.g. making and testing boats of different shapes)</p> <p>To research, design and make products that use levers, pulleys, gears and/or springs and explore their effects.</p> <p>To investigate the effects of friction on movement. (e.g. find out how it slows or stops moving objects, by observing the effects of a brake on a bicycle wheel)</p> <p>To investigate the effects of levers, pulleys and simple machines on movement.</p> <p>To research how scientists helped to develop the theory of gravity. (e.g. Galileo Galilei and Isaac Newton)</p>	Force, gravity, Earth, air resistance, water resistance, friction, mechanisms, simple machines, levers, pulleys, gears
	To understand light and seeing	<p>To understand that they need light in order to see things and that dark is the absence of light</p> <p>To know that light is reflected from surfaces.</p> <p>To understand and describe that light from the sun can be dangerous and that there are ways to protect their eyes.</p>	<p>To spot patterns in what happens to shadows when the light source moves or the distance between the light source and the object changes.</p> <p>To investigate and measure what happens to shadows when the light source moves or the distance between the light source and the object changes.</p>	<p>Straight lines, Light rays.</p> <p>(Y3 vocabulary to recap and build upon - Light, Light source, Dark, Absence of light, Transparent, Translucent, Opaque, Shiny, Matt, Surface, Shadow, Reflect, Mirror, Sunlight, Dangerous)</p>

		<p>To understand how shadows are formed and what might cause these to change.</p> <p>To know how the size of shadows change.</p>	<p>To investigate that shadows are formed when the light from a light source is blocked by an opaque object</p> <p>To investigate what happens when light reflects. (e.g. off a mirror or other reflective surfaces, including playing mirror game)</p> <p>To use knowledge to answer questions about how light behaves.</p>	
	To understand electrical circuits	<p>To know the effect of the number and voltage of cells used in the circuit on the brightness of a lamp or the volume of a buzzer.</p> <p>To understand variations in how components function. (i.e.the brightness of bulbs, the loudness of buzzers and the on/off position of switches)</p> <p>To know and use symbols when representing a simple circuit in a diagram.</p>	<p>To identify the effect of changing one component at a time in a circuit.</p> <p>To investigate, design and make a useful circuit. (e.g. a set of traffic lights, a burglar alarm)</p> <p>To design investigations, to answer questions about the effects of different components in a circuit. (e.g., switches, bulbs, buzzers and motors)</p>	<p>Circuit, complete circuit, circuit diagram, circuit symbol, cell, battery, bulb, buzzer, motor, switch, voltage</p>
	To understand the Earths movement in space	<p>To understand the movement of the Earth, and other planets, relative to the Sun in the solar system.</p> <p>To understand how the geocentric model of the solar system gave way to the heliocentric model by considering the work of scientists.</p> <p>To understand that a moon is a celestial body that orbits a planet (Earth has one moon; Jupiter has four large moons and numerous smaller ones).</p> <p>To understand the movement of the Moon relative to the Earth.</p> <p>To know why some people think that structures such as Stonehenge might have been used as astronomical clocks.</p> <p>To understand the Sun, Earth and Moon as approximately spherical bodies.</p> <p>To understand the idea of the Earth's rotation to explain day and night and the apparent movement of the sun across the sky.</p> <p>To know that the Sun is a star at the centre of our solar system and that it has eight planet.</p>	<p>To research the way that ideas about the solar system have developed.</p> <p>To research and comparing the time of day at different places on the Earth through internet links and direct communication.</p> <p>To research and create simple models of the solar system.</p> <p>To investigate and constructed simple shadow clocks and sundials. (these should be calibrated to show midday and the start and end of the school day)</p>	<p>Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus and Neptune, (Pluto was reclassified as a 'dwarf planet' in 2006)</p> <p>Spherical, Solar system, rotates, star, orbits, planets, axis</p> <p>Suggested scientists: Ptolemy, Alhazen and Copernicus</p>



Dr IPROF says...

Remember to keep asking questions!

- I - identifying and classifying
- P - pattern seeking
- R - research
- O - observing over time
- F - fair and comparative testing



Dr IPROF says...

Remember to keep asking questions!

- I - identifying and classifying
- P - pattern seeking
- R - research
- O - observing over time
- F - fair and comparative testing

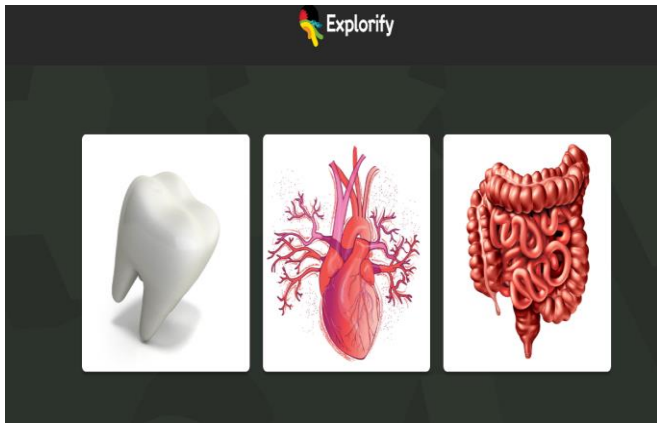
Non Negotiable

- DR IPROF headings are displayed in classrooms
- Key vocabulary (related to skills and vocabulary document) related to topic is displayed and added to with definitions through the topic
- Each lesson to have two objectives - a science enquiry skill & knowledge skill (found in skills and vocabulary document)
- Glossary of vocabulary is shared at the beginning of session and key vocabulary is modelled being used by teacher during session.
- Work is marked and up to date weekly, use of specific vocabulary is celebrated using green highlighter
- Children are given the opportunities to respond to work with teachers feedback at least 3 times in each topic in Key Stage 2
- One skill outcome is focused on during each session
- Learning is child led and engaging
- Planning is clear and followed by all classes in Key Stage - this is talked through before sessions so that there is consistency across Key Stage
- Outcomes are differentiated appropriately to each class to meet children's needs
- Each session begins with 5 minute recap and retrieval game - this could be related to previous session or a previous topic to ensure learning is revisited
- Prior to new topic, children are given developing experts quiz questions to complete to give teachers knowledge of where the children's knowledge is within the topic and children can build on their prior knowledge

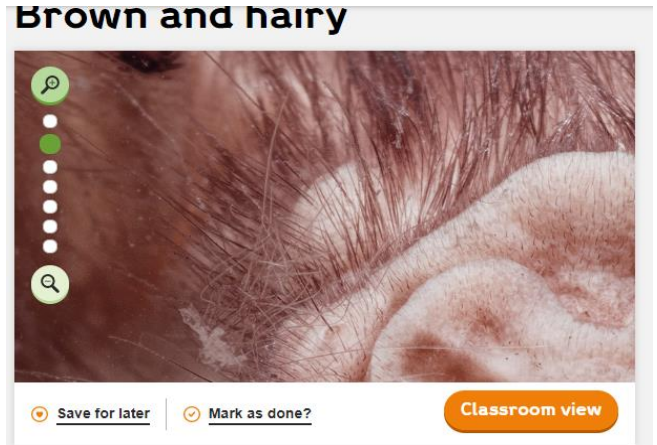
Recap and retrieval

<https://explorify.wellcome.ac.uk/>

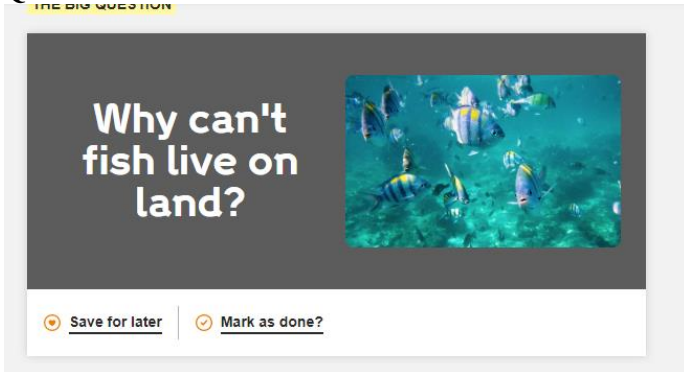
Odd one out



zoom in & zoom out



Question



Big

Interactive quizzing

<https://padlet.com/auth/login>

<https://kahoot.com/>



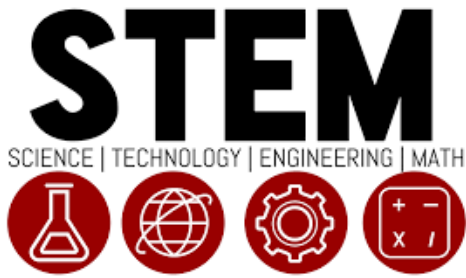
Science sparks – range of hands on investigations related to topics and Key Stages

<https://www.science-sparks.com/category/primary-science/>

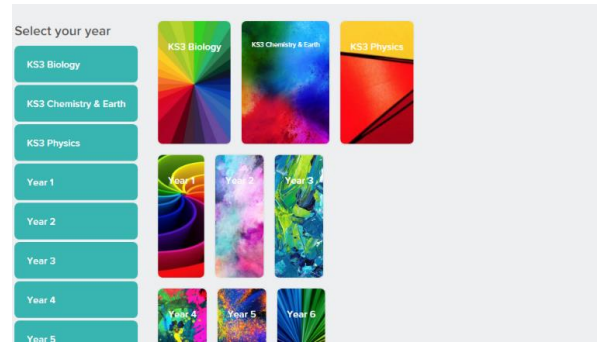


Planning support resources – reference and guides

<https://www.stem.org.uk/>



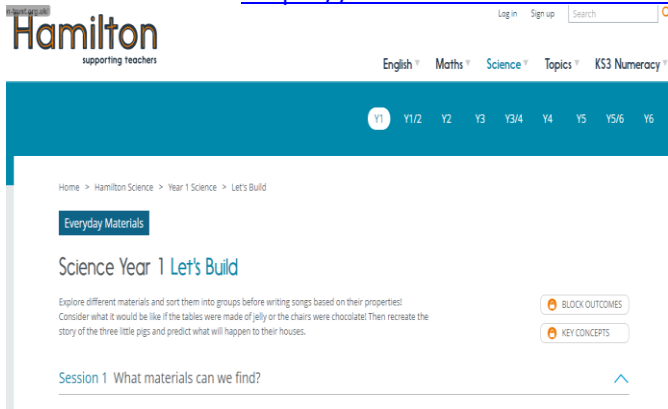
<https://developingexperts.com/>



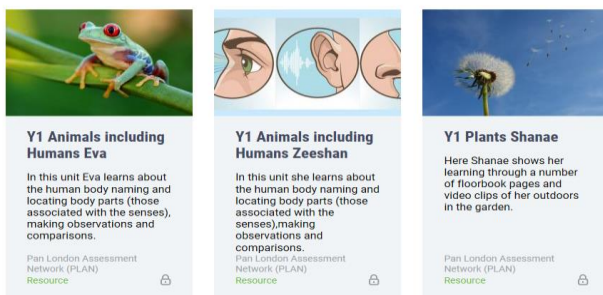
[The Ogden Trust: Promoting the teaching and learning of physics](#)



<https://www.hamilton-trust.org.uk/>



ASE – Plan documents - on google drive





Milestone 3 – Biology
To understand animals and humans

Describe the changes as humans develop to old age.

Basic

Describe the main changes in the human body from childhood to adulthood to old age.

What are the physical signs of humans ageing? (**describe**)

Advancing

Compare and contrast the physical appearance of children and adults.

Graph changes in average heights of males and females at different ages. Summarise your findings.

Deep

Interpret data about normal blood pressure in children and adults and draw some conclusions.

Make **generalisations** about the **relationship** between age and changes in humans.*

See an example on page 205



*Emphasising continuous variables where the comparative degrees end in er e.g. the younger the person the smaller their size.

Greater Depth in Science

© 2019 Chris Quigley Education

205

Science and assessment in EYFS

Science in the early years is taught indirectly through exploratory and hands on learning which underpins our aims for a strong science curriculum. This approach provides children with the opportunities to explore, observe, predict, ask and answer questions and talk about the world around them.

The Foundation Stage curriculum states that all strands should be taught through:

- playing and exploring - children investigate and experience things, and 'have a go'
- active learning - children concentrate and keep on trying if they encounter difficulties, and enjoy achievements
- creating and thinking critically - children have and develop their own ideas, make links between ideas, and develop strategies for doing things

Starting this approach from a young age, creates a strong basis for science enquiry to be built upon through the national curriculum. Providing children with opportunities to explore science within the early years is also underpinned by the aims of the 'Understanding the world' strand of the Foundation Stage curriculum.

What will pupils explore through 'Understanding the world'.

Children will have opportunities to explore creatures, people, plants and objects in their natural environments. They observe and manipulate objects and materials to identify differences and similarities. As well as learning to use their senses to explore the environment around them.

Through this children will be encouraged to ask questions about why things happen and how things work and also be provided with opportunities to begin to build a foundation of enquiry skills such as observing, asking questions, investigating and communicating their ideas.

Early learning assessment goal EG14 'Understanding the world'.

ELG 14 The world:

- Children know about similarities and differences in relation to places, objects, materials and living things
- They talk about the features of their own immediate environment and how environments might vary from one another
- They make observations of animals and plants and explain why some things occur, and talk about changes

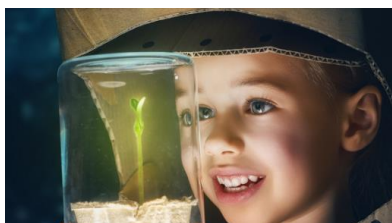
Science sparks – investigations themed to topics

<https://www.science-sparks.com/early-years-science-themed-activities/>



Scientific explorer's activities

<https://www.tes.com/teaching-resources/blog/scientific-explorations-eyfs>

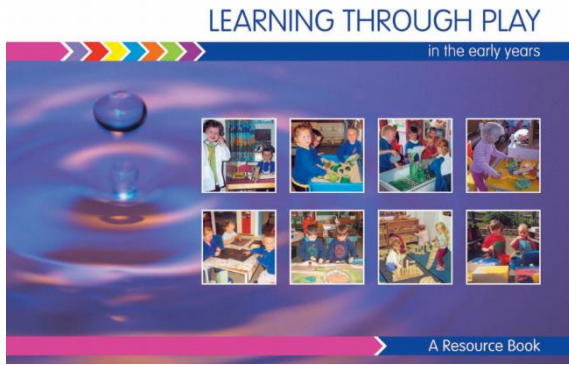


...s for strands of Understanding of the world.

[ing/pairing.html](#)



Examples of activities for use in sand, water, creative, imaginative and construction play
http://www.nicurriculum.org.uk/docs/foundation_stage/learning_through_play_ey.pdf



Activities to explore the ‘diverse planet’ see contents photo
https://www.britishecienceweek.org/app/uploads/2020/01/BSA_BSW_EarlyYears_1119v6.pdf



Our Diverse Planet	
Rainbow collectors	8
Take it home: Brilliant bubbles	9
People paper chain	10
Make your own animal flip book	11
What's in the box?	12
Feely walls	13
Ice blocks	14

Range of activities to support the whole ‘Understanding the world’ strand
<https://www.nurseryworld.co.uk/practice/the-early-years-curriculum/areas-of-learning-understanding-the-world>



parts it has

Classify - assign it to a group or category

Pattern seek – finding common trends and looking for similarities between groups and objects

Research – using different sources to find the answers to questions

Observe over time – watching something over a period of time – ranging from minutes to months

Fair test – changing only one variable in an investigation and keeping others the same

Comparative test – using more than one object or material so find similarities and differences

Source – a document that provides information

Variable – a feature or fact that can be changed

Record – to note down information

Science – the study of the structure and behaviour of the physical and natural world

Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Which type of compost grows the tallest sunflower?	Do cress seeds grow quicker inside or outside?	Which conditions help seeds germinate faster?	How does the average temperature of the pond water change in each season?	Which seed shape takes the longest time to fall?	Which is the most common invertebrate on our school playing field?
Which tree has the biggest leaves?	Do amphibians have more in common with reptiles or fish?	How does the skull circumference of a girl compare with that of a boy?	In our class, are omnivores taller than vegetarians?	Who grows the fastest, girls or boys?	Which type of exercise has the greatest effect on our heart rate?
Is our sense of smell better when we can't see?	Do bananas make us run faster?	Which soil absorbs the most water?	Does seawater evaporate quicker than fresh water?	Which type of sugar dissolves the fastest?	What is the most common eye colour in our class?
In which season does it rain the most?	Is there the same level of light in the evergreen wood compared with the deciduous wood?	Which pair of sunglasses will be best at protecting our eyes?	Which material is best to use for muffling sound in ear defenders?	How does the length of daylight hours change in each season?	Which material is most reflective?
Which materials are the most flexible?	Which shapes make the strongest paper bridge?	Which magnet is strongest?	Are two ears better than one?	Which shoe is the most slippy?	Which make of battery lasts the longest?
Which materials are the most absorbent?	Which material would be best for the roof of the little pig's house?	Which surface is best to stop you slipping?	Which metal is the best conductor of electricity?	Which shape parachute takes the longest to fall?	Which type of fruit makes the best fruity battery?

Examples of comparative tests

Examples of fair tests

Year 3	Year 4	Year 5	Year 6
How does the length of the carnation stem affect how long it takes for the food colouring to dye the petals?	Does the amount of light affect how many woodlice move around?	How does the level of salt affect how quickly brine shrimp hatch?	How does the temperature affect how much gas is produced by yeast?
How does the angle that your elbow/knee is bent affect the circumference of your upper arm/thigh?	How does the mass of a block of ice affect how long it takes to melt?	How does age affect a human's reaction time?	How does the length of time we exercise for affect our heart rate?
How does adding different amounts of sand to soil affect how quickly water drains through it?	How does the surface area of a container of water affect how long it takes to evaporate?	How does the temperature of tea affect how long it takes for a sugar cube to dissolve?	Can exercising regularly affect your lung capacity?
How does the number of layers of transparent plastic affect how much light can pass through?	How does the volume of a drum change as you move further away from it?	How does the angle of launch affect how far a paper rocket will go?	How does the angle that a light ray hits a plane mirror affect the angle at which it reflects off the surface?
How does the mass of an object affect how much force is needed to make it move?	How does the thickness of a conducting material affect how bright the lamp is?	How does the surface area of a container affect the time it takes to sink?	How does the voltage of the batteries in a circuit affect the brightness of the lamp?
How does the distance between the shadow puppet and the screen affect the size of the shadow?	How does the length of a guitar string/tuning fork affect the pitch of the sound?	How does the surface area of a parachute affect the time it takes to fall to the ground?	How does the voltage of the batteries in a circuit affect the volume of the buzzer?

Please note fair tests are not statutory to be taught before year 3 however this can be dripped in as a talking point through Key Stage

ASE planning documents


ASE assessment documents can be found on google drive for each year group and topic.

These documents provide good examples of evidence for a children achieving secure in each science topic but also provide examples of activities to be used during lessons to support knowledge and working scientifically. These can be referred to, to inform planning.

Examples of activities for knowledge as well as points to look out for in books as assessment.

Key knowledge for teacher’s reference but also to teach to children to ensure ‘secure’ on topic.

Examples of activities for knowledge as well as points to look out for in books as assessment.



	Assessment guidance	Key learning	Possible Evidence
SECURE	Shows understanding of a concept using scientific vocabulary correctly	<p>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. These key features can be used to identify them.</p> <p>Animals eat certain things - some eat other animals, some eat plants, some eat both plants and animals.</p> <p>Key vocabulary Head, body, eyes, ears, mouth, teeth, leg, tail, wing, claw, fin, scales, feathers, fur, beak, paws, hooves</p> <p>Names of animals experienced first-hand from each vertebrate group N.B. The children need to be able to name and identify a range of animals in each group e.g. name specific birds and fish. They do not need to use the terms mammal, reptiles etc. or know the key characteristics of each, although they will probably be able to identify birds and fish, based on their characteristics.</p> <p>The children also do not need to use the words carnivore, herbivore and omnivore. If they do, ensure that they understand that carnivores eat other animals not just meat.</p>	<p>Can name a range of animals which includes animals from each of the vertebrate groups</p> <p>Can describe the key features of these named animals</p> <p>Can label key features on a picture/diagram</p> <p>Can write descriptively about an animal</p> <p>Can write a What am I? riddle about an animal</p> <p>Can describe what a range of animals eat</p>
	Applying knowledge in familiar related contexts, including a range of enquiries	<p>Make first hand close observations of animals from each of the groups</p> <p>Compare two animals from the same or different group</p> <p>Classify animals using a range of features</p> <p>Identify animals by matching them to named images</p> <p>Classify animals according to what they eat</p>	<p>Can sort and group animals using similarities and differences</p> <p>Can use simple charts etc. to identify unknown animals</p> <p>Can create a drawing of an imaginary animal labelling its key features</p> <p>Can use secondary resources to find</p>

Plants			
EYFS	Key Stage 1	Lower Key Stage 2	Upper Key Stage 2
<p>Children can talk about some of the things they have observed such as plants, animals, natural and found objects</p> <p>Children can explore the natural world around them, making observations and drawing pictures of plants.</p>	<p>Children can observe and describe how seeds and bulbs grow into mature plants.</p> <p>Children are able to Identify and describe the basic structure of a variety of common flowering plants, including roots, stem/trunk, leaves and flowers.</p> <p>Children are able to Identify and name a variety of common plants including green plants, wild plants and trees and those classified as deciduous and evergreen.</p> <p>Children can find out and describe how plants need water, light and a suitable temperature to grow and stay healthy.</p>	<p>Children can explore the role of flowers in life cycles of flowering plants, including pollination, seed formation and seed dispersal.</p> <p>Children are able to Investigate the way in which water is transported within plants.</p> <p>Children can explore the requirements of plants for life and growth (air, light, water, nutrients from soil and room to grow) and how they vary from plant to plant.</p> <p>Children are able to Identify and describe the functions of different parts of flowering plants; stem, roots, leaves and flowers</p>	<p>Children relate knowledge of plants to studies of evolution and inheritance</p> <p>Children relate knowledge of plants to studies of all living things</p>

Animals including humans			
EYFS	Key Stage 1	Lower Key Stage 2	Upper Key Stage 2
<p>Children can talk about some of the things they have observed such as plants, animals, natural and found objects</p> <p>Children can explore the natural world around them, making observations and drawing pictures of animals.</p>	<p>Children can Identify and name a variety of common animals that are birds, fish, amphibians, reptiles, mammals and invertebrates.</p> <p>Children can Identify and name a variety of common animals that are carnivores, herbivores and omnivores.</p> <p>Children are able to describe and compare the structure of a variety</p>	<p>Children can identify that animals, including humans, need the right types and amounts of nutrition, and that they cannot make their own food and they get nutrition from what they eat.</p> <p>Children can identify that humans and some animals have skeletons and muscles for support, protection and movement.</p>	<p>Children can identify and name the main parts of the human circulatory system, and explain the functions of the heart, blood vessels and blood.</p> <p>Children are able to describe the changes as humans develop from birth to old age.</p> <p>Children can recognise the importance of diet, exercise, drugs and lifestyle on the way the human body functions</p>

	<p>of common animals (birds, fish, amphibians, reptiles, mammals and invertebrates, including pets)</p> <p>Children can identify, name, draw and label the basic parts of the human body and associate which part of the body is associated with each sense.</p> <p>Children notice that animals, including humans, have offspring which grow into adults.</p> <p>Children can investigate and describe the basic needs of animals, including humans, for survival (water, food and air).</p> <p>Children can describe the importance for humans of exercise, eating the right amounts of different types of food and hygiene.</p> <p>Children can describe and compare the structure of a variety of common animals.</p> <p>Children can identify how humans resemble their parents in many ways.</p>	<p>Children can construct and interpret a variety of food chains, identify producers, predators and prey.</p> <p>Children are able to describe the simple functions of the parts of the digestive system in humans.</p> <p>Children can identify the different types of teeth in humans and their simple functions.</p>	
--	--	---	--

Living things and their habitats			
EYFS	Key Stage 1	Lower Key Stage 2	Upper Key Stage 2
Children can talk about some of the things they have observed such as plants, animals, natural and found objects.	Children can explore and compare the differences between things that are living, that are dead and that have never been alive.	<p>Children can explore and use classification keys.</p> <p>Children can recognise that living things can be grouped in a variety of ways.</p>	n/a

<p>Children can explore the natural world around them, making observations and drawing pictures of animals and plants;</p> <p>Children know some similarities and differences between the natural world around them and contrasting environments, drawing on their experiences and what has been read in class.</p>	<p>Children can identify that most living things live in habitats to which they are suited.</p> <p>Children are able to describe how different habits provide for the basic needs of different kinds of animals and plants, and how they depend on each other.</p> <p>Children can identify and name a variety of plants and animals in their habitats, including micro habitats.</p> <p>Children can describe how animals obtain their food from plants and other animals, using the idea of simple food chains.</p> <p>Children can identify and name different sources of food.</p>	<p>Children can recognise that environments can change and that this can sometimes pose dangers to specific habitats.</p>	
---	--	---	--

Everyday materials

EYFS	Key Stage 1	Lower Key Stage 2	Upper Key Stage 2
<p>N/A</p>	<p>Children can distinguish between an object and the material from which it is made with some correction if needed.</p> <p>Identifies and names a variety of everyday materials.</p> <p>Children can describe the simplest physical properties of a variety of everyday materials e.g. strength, flexibility and transparency.</p> <p>Children compare and group together a variety of everyday materials on the basis of their simple physical properties using appropriate vocabulary.</p> <p>Children find out how the shapes of solid objects</p>	<p>N/A</p>	<p>Children compare and group together everyday materials based on evidence from comparative and fair tests, including their hardness, solubility, conductivity (electrical and thermal) and response to magnets</p>

	<p>made from some materials can be changed.</p> <p>Children can identify and compare the uses of a variety of everyday materials, including wood, metal, plastic, glass, brick/rock and paper/cardboard.</p>		
--	--	--	--

Seasonal changes			
EYFS	Key Stage 1	Lower Key Stage 2	Upper Key Stage 2
Children understand some important processes and changes in the natural world around them, including the seasons and changing states of matter.	<p>Children can observe the apparent movement of the sun during the day.</p> <p>Children can observe changes across the four seasons.</p> <p>Children are able to observe and describe weather associated with the seasons and how day length varies.</p>	N/A	N/A

States of matter			
EYFS	Key Stage 1	Lower Key Stage 2	Upper Key Stage 2
Children understand some important processes and changes in the natural world around them, including the seasons and changing states of matter.	N/A	<p>Children compare and group materials together, according to whether they are solids, liquids or gases.</p> <p>Children observe that some materials change</p>	<p>Children understand how some materials will dissolve in liquid to form a solution and describe how to recover a substance from a solution</p> <p>Children use knowledge of solids, liquids and</p>

		<p>state when they are heated or cool.</p> <p>Children measure the temperatures at which this happens in degrees Celsius building on teaching in mathematics.</p> <p>Children can identify the parts played by evaporation and condensation in the water cycle.</p> <p>Children associate the rate of evaporation with temperature.</p>	<p>gases to decide how mixtures might be separated, including through filtering, sieving and evaporating</p> <p>Children give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic</p> <p>Children demonstrate that dissolving, mixing and changes of state are reversible changes</p> <p>Children can explain that some changes result in the formation of new materials, and that this kind of change is not usually reversible, including changes associated with burning, oxidation and the action of acid on bicarbonate of soda</p>
--	--	---	--

Sound			
EYFS	Key Stage 1	Lower Key Stage 2	Upper Key Stage 2
N/A	N/A	<p>Children observe and name a variety of sources, noticing we hear with our ears.</p> <p>Children identify how sounds are made, associating some of them with something vibrating.</p> <p>Children can recognise that vibrations from sound travel through a medium to the ear.</p>	<p>Children can find patterns between the pitch of a sound and features of the object that produced it</p> <p>Children can find patterns between the volume of a sound and the strength of the vibrations that produced it</p> <p>Children can recognise that sounds get fainter as the distance from the sound source increases</p>

Electricity			
EYFS	Key Stage 1	Lower Key Stage 2	Upper Key Stage 2
N/A	N/A	<p>Children identify common appliances that run on electricity. Children are able to construct a simple series electrical circuit.</p> <p>Children are able to identify whether or not a lamp will light in a simple series circuit based on whether or not the lamp is part of a complete loop with a battery.</p> <p>Children recognise that a switch opens and closes a circuit and associates this with whether or not a lamp lights in a simple series circuit.</p> <p>Children recognise some common conductors and insulators and associate metal with being good conductors.</p> <p>Children identify common appliances that run on electricity.</p> <p>Children are able to construct a simple series circuit identifying and naming its main parts including wires, bulbs, switches and buzzers.</p>	<p>Children use recognised symbols when representing a simple circuit in a diagram</p> <p>Children associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit</p> <p>Children compare and give reasons for variations in how components function, including the brightness of bulbs, the loudness of buzzers and the on/off position of switches</p> <p>Children know and consider various forms of making electricity.</p> <p>Children can discuss the impact of forms of electricity on the environment.</p>

Forces and magnets			
EYFS	Key Stage 1	Lower Key Stage 2	Upper Key Stage 2
N/A	N/A	Children know how things move on different surfaces	Children describe magnets as having two poles

		<p>Children understand that some forces need contact between two objects, but magnetic forces can act at a distance</p> <p>Children know how magnets attract or repel each other and attract some materials and not others</p> <p>Children know a variety of everyday materials can be grouped and compared on the basis of whether they are attracted to a magnet, and identify some magnetic materials</p> <p>Children know magnets as having two poles.</p> <p>Children understand /predict whether two magnets will attract or repel each other, depending on which poles are facing.</p>	<p>Children predict whether two magnets will attract or repel each other, depending on which poles are facing</p> <p>Children can explain that supported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object</p> <p>Children can identify the effect of drag forces such as air resistance, water resistance and friction that acts between two moving surfaces</p> <p>Children describe, in terms of drag forces, why moving objects that are not driven tend to slow down</p> <p>Children understand that force and motion can be transferred through mechanical devices such as gears, pulleys, levers and springs</p> <p>Children understand that some mechanisms, including levers, pulleys and gears, allow a smaller force to have a greater effect.</p>
--	--	---	--

Rocks			
EYFS	Key Stage 1	Lower Key Stage 2	Upper Key Stage 2
N/A	<p>Children compare and group together different kinds of rocks on the basis of their simple, physical properties</p> <p>Children relate the simple physical properties of</p>	N/A	N/A

	<p>some rocks to their formation (igneous or sedimentary)</p> <p>Children describe in simple terms how fossils are formed when things that have lived are trapped within sedimentary rocks.</p> <p>Children can recognise that soils are made from rocks and organic matter.</p>		
--	--	--	--

Light			
EYFS	Key Stage 1	Lower Key Stage 2	Upper Key Stage 2
N/A	N/A	<p>Children can observe and name a variety of sources of light including electric lights, flames and the sun.</p> <p>Children explore that we see things because light travels from light sources to our eyes. Children notice that light is reflected from surfaces.</p> <p>Children can recognise shadows are formed when light from a light source is blocked by a solid object.</p> <p>Children can recognise that light is required in order to see things and that dark is the absence of light.</p> <p>Children recognise that light from the sun can be dangerous and there are ways to protect the eyes.</p>	<p>Children understand that light appears to travel in straight lines</p> <p>Children use the idea that light travels in straight lines to explain that objects are seen because they give out or reflect light into the eyes</p> <p>Children use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them, and to predict the size of shadows when the position of the light source changes</p> <p>Children are able to explain that we see things because light travels from light sources to our eyes or from objects and then to our eyes</p>

		Children are able to find patterns in the way that the size of shadows change.	
--	--	--	--

Evolution

EYFS	Key Stage 1	Lower Key Stage 2	Upper Key Stage 2
N/A	N/A	N/A	<p>Children can identify how plants and animals, including humans, resemble their parents in many features.</p> <p>Children recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago.</p> <p>Children can identify how animals are suited to and adapt to the environment in different ways.</p> <p>Children know adaptation may lead to evolution.</p>

Earth and Space

EYFS	Key Stage 1	Lower Key Stage 2	Upper Key Stage 2
N/A	N/A	N/A	<p>To understand the movement of the Earth, and other planets, relative to the Sun in the solar system.</p> <p>To understand how the geocentric model of the solar system gave way to the heliocentric model</p>

			<p>by considering the work of scientists.</p> <p>To understand that a moon is a celestial body that orbits a planet (Earth has one moon; Jupiter has four large moons and numerous smaller ones).</p> <p>To understand the movement of the Moon relative to the Earth.</p> <p>To know why some people think that structures such as Stonehenge might have been used as astronomical clocks.</p> <p>To understand the Sun, Earth and Moon as approximately spherical bodies.</p> <p>To understand the idea of the Earth's rotation to explain day and night and the apparent movement of the sun across the sky.</p> <p>To know that the Sun is a star at the centre of our solar system and that it has eight planets.</p>
--	--	--	--