

Progression in Working Scientifically Skills

Years 1 and 2	Years 3 and 4	Years 5 and 6
<i>Asking questions and recognising that they can be answered in different ways</i>		
Asking simple questions and recognising that they can be answered in different ways <i>Examine plants in a garden for signs of them having been eaten. Consider what may have eaten the plants and what else might be living in that place</i>	Asking relevant questions and using different types of scientific enquiries to answer them <i>What do plants need in order to grow? Investigating the effects of light, temperature, water, air on seedlings</i>	Planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary <i>Investigate and recreate heartrates for varying levels of exertion, giving explanations for observations</i>
<i>Observing closely and taking measurements</i>		
Observing closely, using simple equipment. <i>Observe closely the growth of seeds over regular periods using magnifying glasses</i>	Making systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers <i>Observe the growth of bean seedlings over time. Use data loggers to record 24 hours of light and temperature readings.</i>	Taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate. <i>Observe, measure and identify patterns in changing shadows across a day.</i>
<i>Engaging in practical enquiry to answer questions</i>		
Performing simple tests <i>Testing the best conditions for growing seeds</i> Identifying and classifying <i>Identifying plants, comparing them to named images</i>	Setting up simple practical enquiries, comparative and fair tests <i>Why there are differences in the growth of the seedlings? What factors are affecting growth?</i>	Planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary <i>Identify features in animals and plants that are passed on to offspring and explore this process by considering the artificial breeding of animals or plants e.g. dogs.</i>

Recording and presenting evidence		
<p>Gathering and recording data to help in answering questions. <i>Set up diaries to record the growth of beans over a period of time. Use findings to suggest reasons for different growth</i></p>	<p>Gathering, recording, classifying and presenting data in a variety of ways to help in answering questions <i>Classify plants found in local area according to flowering, non flowering, size/shape of leaves etc.</i></p> <p>Recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables <i>Classify plants and animals, presenting this in a range of ways e.g. Venn diagrams, Carroll diagrams and keys.</i></p>	<p>Recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs <i>Classify plants and animals, presenting this in a range of ways e.g. Venn diagrams, Carroll diagrams and keys.</i></p> <p>Using test results to make predictions to set up further comparative and fair tests <i>Undertake a study of air resistance by exploring falling paper cones or cup-cake cases, and designing and making a variety of parachutes and carrying out fair tests to determine which designs are the most effective.</i></p>
Answering questions and concluding		
<p>Using their observations and ideas to suggest answers to questions <i>Make a collective map of a garden plot, labelling the plants and predicting what they will turn into when they are fully grown</i></p>	<p>Using straightforward scientific evidence to answer questions or to support their findings. <i>Make a summary of class findings from the seedling investigation with notes and drawings of results.</i></p> <p>Identifying differences, similarities or changes related to simple scientific ideas and processes <i>Create detailed models of sections through fruits showing flesh, skin, seeds etc</i></p> <p>Using results to draw simple conclusions, make predictions for new values and suggest improvements and raise further questions <i>Report on how their requirement seems to be affecting the health/growth of seedlings</i></p>	<p>Identifying scientific evidence that has been used to support or refute ideas or arguments <i>Exploring the work of scientists and scientific research about the relationship between diet, exercise, drugs, lifestyle and health.</i></p> <p>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 <i>Create a print advert that explores the impact of drugs and alcohol on the human body</i></p>

Progression in Knowledge

Biology: Plants

EYFS/ Early Learning Goal

ELG: The Natural World Children at the expected level of development will: - Explore the natural world around them, making observations and drawing pictures of animals and plants; 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; - Understand some important processes and changes in the natural world around them, including the seasons and changing states of matter. Children will.

- Plant seeds and care for growing plants.
- Understand the key features of the life cycle of a plant and an animal.
- Begin to understand the need to respect and care for the natural environment and all living things.
- Explore the natural world around them.
- Recognise some environments that are different to the one in which they live.

Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
<p>(1) To identify and name a variety of common wild and garden plants, including deciduous and evergreen trees</p> <p>(2) To identify and describe the basic structure of a variety of common flowering plants, including trees.</p>	<p>(1) To know and describe how seeds and bulbs grow into mature plants</p> <p>(2) To know and describe how plants need water, light and a suitable temperature to grow and stay healthy.</p> <p>See also Yr2 - Living things and their habitats (1), (2)</p>	<p>(1) To identify and describe the functions of different parts of flowering plants: roots, stem/trunk, leaves and flowers</p> <p>(2) To 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>(3) To know the way in which water is</p>	<p>See also Yr4 - Living things and their habitats (1), (2), (3)</p>	<p>See also Yr5 - Living things and their habitats (2)</p>	<p>See also Yr6 - Living things and their habitats (1), (2)</p>

Progression of Skills and Knowledge in Science

		<p>transported within plants</p> <p>(3)To know the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal.</p>			
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Key Scientists/People (Inc. Black, Asian, and minority ethnic)

- Joseph Banks (1743-1820) Botanist and naturalist – travelled James Cook's first voyage circumnavigated the globe in the ship Endeavour -collected plants from previously unexplored habitats
- George Washington Carver (c. 1864 – 1943), an agricultural scientist who developed many important crops and came up with methods to prevent soil degradation
- Emmett Chapelle (1925 – 2019), a biologist who is known for his work on bioluminescence. (the biochemical emission of light by living organisms such as glow-worms and deep-sea fish)
- Turhan Baytop (1920 –2002) was a Turkish botanist and pharmacist from Istanbul.
- George Forrest 1873 – 1932 – Botanist and plant collector

Vocabulary

plant tree leaf seed root stem trunk flower deciduous evergreen bark blossom petal fruit	seeds bulbs grow plants water light air temperature healthy	root stem trunk leaves flowers flowering plant buds non flowering plant branch nutrients soil pollination air light			
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Progression of Skills and Knowledge in Science

bulb branch bud oak holly fir grass dandelion daisy rose		water transported life cycle seed formation dispersal fruit osmosis			
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Biology: Animals including humans

EYFS/Early Learning Goal

ELG: The Natural World Children at the expected level of development will: - Explore the natural world around them, making observations and drawing pictures of animals and plants; 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; - Understand some important processes and changes in the natural world around them, including the seasons and changing states of matter. Children will

- Use all their senses in hands-on exploration of natural materials.
- Name and describe people who are familiar to them.

Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
<p>(1)To identify and name variety of common animals including fish, amphibians, reptiles, birds and mammals</p> <p>(2)To identify and name a variety of common animals that are carnivores, herbivores and omnivores</p> <p>(3)To identify and name about describe and</p>	<p>(1) To understand that animals, including humans, have offspring which grow into adults</p> <p>(2) To know the basic needs of animals, including humans, for survival (water, food and air)</p> <p>(3) To describe the importance for humans of exercise, eating the</p>	<p>(1) To know 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</p> <p>(2) To know that humans and some other animals have skeletons</p>	<p>(1)To describe the simple functions of the basic parts of the digestive system in humans.</p> <p>(2)To know about the different types of teeth in humans and their simple functions.</p> <p>(3)To construct and interpret a variety of food chains, identifying</p>	<p>(1)To describe the changes as humans develop to old age.</p> <p>See also Yr 5 - Living things and their habitats (1), (2)</p>	<p>(1)To know and name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood.</p> <p>(2)To recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function.</p>

Progression of Skills and Knowledge in Science

compare the structure of a variety of common animals (fish, amphibians, reptiles, birds and mammals, including pets)	right amounts of different types of food, and hygiene	and muscles for support, protection and movement	producers, predators and prey.		(3)To describe the ways in which nutrients and water are transported within animals, including humans See also Yr6 - Living things and their habitats (1), (2)
(4)To identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense					

Key Scientists/People (Inc. Black, Asian, and minority ethnic)

- Amy Vedder (1951 -) – Wildlife biologist and conservationist
- **Professor Robert Winston (1940 -) – contemporary scientist YR5**
- **William Harvey (1578 – 1657) Discovered the circulatory system YR6**
- Donald Palmer (b. 1962 -) Donald Palmer's job involves studying, and teaching others how, the human body protects itself from infections and malfunctions, including cancer.
- Charlotte Armah.(b. 1970 -) She leads experiments involving human volunteers to learn whether eating particular foods, especially broccoli, can protect us from diseases such as cardiovascular disease and cancer
- Marie Daly (1921 – 2003) USA Chemist, Researcher and Activist
First African-American woman to receive a Ph.D. in chemistry in the United States. She worked closely with scientist Dr. Quentin B. Deming and their work opened up a new understanding of how foods and diet can affect the health of the heart and the circulatory system
- Alice ball (1892 – 1916) USA, Chemist
Developed a method to successfully treat leprosy which was used for 20 years.

Vocabulary

carnivore herbivore omnivore fish	Healthy unhealthy grow strong	nutrition bones skeleton muscles	digestive system large intestine small intestine liver	infancy preadolescent adolescent puberty	circulation heart blood vessel muscle
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Progression of Skills and Knowledge in Science

snake senses frog hen pigeon squirrel mouse see legs wings limbs fins fur hear scales feathers fly swim skin smell taste feel eyes ears nose tongue	clean air germs sick illness food offspring knee breathe exercise adult young ear mouth head neck arm elbow tongue teeth leg face hair eye	food groups fat sugar carbohydrate protein diet vitamin mineral fibre roughage skull ribs spine carnivore herbivore	colon pancreas kidney stomach oesophagus molar canine incisor predator prey producer	adult mature immature teenager youth elderly ancestor growth	muscular lifestyle nutrients drugs exercise heart rate blood pressure
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Biology: Living things and their habitats

EYFS/Early Learning Goal

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- Begin to understand the need to respect and care for the natural environment and all living things.
- Explore the natural world around them.
- Recognise some environments that are different to the one in which they live.

Progression of Skills and Knowledge in Science

Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
<p>See also Yr - Plants (1), (2), (3)</p> <p>Yr1 - Animals including humans (1), (2), (3)</p> <p>Yr1- Seasonal change (1)</p>	<p>(1)To know the differences between things that are living, dead, and things that have never been alive</p> <p>(2) To identify that most living things live in habitats to which they are suited and describe how different habitats provide for the basic needs of different kinds of animals and plants, and how they depend on each other</p> <p>(3)To identify and name a variety of plants and animals in their habitats, including microhabitats</p> <p>(4)To 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> <p>(5) To compare animals in familiar habitats with animals in less familiar habitats e.g. forests (mangrove, rainforest)</p>	<p>See also Yr3 - Plants (3)</p>	<p>(1) To recognise that living things can be grouped in a variety of ways</p> <p>(2)To explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment</p> <p>(3)To recognise that environments can change and that this can sometimes pose dangers to living things.</p> <p>See also Yr4 - Animals, including humans (3)</p>	<p>(1) To describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird</p> <p>(2) To describe the life process of reproduction in some plants and animals.</p>	<p>(1) To describe how living things are classified into broad groups according to common observable characteristics and based on similarities and differences, including microorganisms, plants and animals</p> <p>(2) To give reasons for classifying plants and animals based on specific characteristics.</p>

Progression of Skills and Knowledge in Science

	See also Yr2 - Animals including humans (1)				
<p style="text-align: center;">Key Scientists/People (Inc. Black, Asian, and minority ethnic)</p> <ul style="list-style-type: none"> David Attenborough (b. 1926 -) is an English broadcaster, natural historian and author. Jane Goodall. (b 1934 -), is an English primatologist and anthropologist. Considered to be the world's foremost expert on chimpanzees Carl Linnaeus (1707 – 1778), was a Swedish botanist, zoologist, taxonomist – famous for the classification system YR6 Berry J. Brosi, an assistant professor at Emory University in Atlanta, and Heather M. Briggs, a graduate student at the University of California, Santa Cruz found that a loss of bees affects a plant's ability to reproduce. (Year 5 – reproduction in plants) Dr. Mark Richards UK, (b. 1970 -). He developed equipment that could detect and measure the gases in the air around us. A spectrometer analyses which parts of light can travel through the air. Measure pollution in our atmosphere. 					
Vocabulary					
	habitat environment, natural, conditions, shelter, living, desert dead microhabitat shelter log ocean Pond, food chain rainforest, equator, canopy, mangrove, roots, tangled, temperature, evergreen seashore, swamp Woodland, creature, bush, deciduous stone canopy		Life cycle, mammal, amphibian, insect Bird, environment, reproduction, herbivore Amphibians, vertebrate, invertebrate, rainforest Deforestation, habitat, mini-beast	life cycle, mammal, amphibian, reptile, Fish, bird, vertebrate, invertebrate Insect, arachnid, Mollusc, reproduction Seed, germinate, classification	Micro-organism, invertebrate, vertebrate, amphibian, Reptile, bird, mammal classification

Biology - Evolution and inheritance

EYFS/Early Learning Goal

ELG: The Natural World Children at the expected level of development will: - Explore the natural world around them, making observations and drawing pictures of animals and plants; 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; - Understand some important processes and changes in the natural world around them, including the seasons and changing states of matter.

- Begin to understand the need to respect and care for the natural environment and all living things.
- Recognise some environments that are different to the one in which they live.

Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
	See Yr2 - Living things and their habitats (2)	See Yr3 - Rocks (2)	See Yr4 - Living things and their habitats (3)		<p>(1) To 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>(2) To recognise that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents.</p> <p>(3) To know that animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution.</p>

Key Scientists/People (Inc. Black, Asian, and minority ethnic)

- Charles Darwin (1809-1882) - Authored one of the most famous books in history, On the Origin of Species, in which he described and provided evidence for the theory of evolution by natural selection. **YR6**
- Mary Anning (1799 –1847) was an English fossil collector, dealer, and palaeontologist. **YR6**

Progression of Skills and Knowledge in Science

- Alfred Russel Wallace (1823 –1913) was a British naturalist, explorer, geographer, anthropologist, biologist and illustrator.^[1] He is best known for independently conceiving the theory of evolution through natural selection; **YR6**
- John Edmonstone (1793 - ?) was born into slavery on a plantation, in what is now Guyana. He gained his freedom and moved to Edinburgh where he learnt the skill of taxonomy. He became a teacher at Edinburgh University where he taught none other than Charles Darwin, in preparation for his voyage south on the HMS Beagle. Darwin used the techniques he had learnt from Edmonstone to preserve the famous finches, which informed his theory of evolution.

Vocabulary

fossil
offspring
adaptation
evolution
inheritance
characteristic
variation
environment
palaeontologist

Chemistry: Materials

EYFS/Early Learning Goal

ELG: The Natural World Children at the expected level of development will: - Explore the natural world around them, making observations and drawing pictures of animals and plants; 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; - Understand some important processes and changes in the natural world around them, including the seasons and changing states of matter.

- Use all their senses in hands-on exploration of natural materials.
- Explore collections of materials with similar and/or different properties.
- Talk about the differences between materials and changes they notice.

Year 1
(Everyday Materials)

Year 2
(Uses of everyday materials)

Year 3

Year 4
(States of matter)

Year 5
(Properties and changes of materials)

Year 6

(1) To distinguish between an object and

(1) To identify and compare the suitability

See Yr3 - Rocks (1), (2)

(1) To compare and group materials

(1) To compare and group together everyday materials on

Progression of Skills and Knowledge in Science

<p>the material from which it is made.</p> <p>(2) To identify and name a variety of everyday materials, including wood, plastic, glass, metal, water, and rock.</p> <p>(3) To describe the simple physical properties of a variety of everyday materials.</p> <p>(4) To compare and group together a variety of everyday materials on the basis of their simple physical properties.</p>	<p>of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses</p> <p>(2) To find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching.</p>		<p>together, according to whether they are solids, liquids or gases.</p> <p>(2) To know that some materials change state when they are heated or cooled, and measure or research the temperature at which this happens in degrees Celsius ($^{\circ}\text{C}$).</p> <p>(3) To know about the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature</p>	<p>the basis of their properties, including their hardness, solubility, transparency, conductivity (electrical and thermal), and response to magnets.</p> <p>(2) 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>(3) To use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating.</p> <p>(4) To give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic.</p> <p>(5) To understand that dissolving, mixing and changes of state are reversible changes</p> <p>(6) To know that some changes result in the</p>	
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Progression of Skills and Knowledge in Science

				formation of new materials, and that this kind of change is not usually reversible, including changes associated with burning and the action of acid on bicarbonate of soda	
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Key Scientists/People (Inc. Black, Asian, and minority ethnic)

- Spencer Ferguson Silver III (1941 – 2021) was an American chemist and inventor who specialised in adhesives. Credited with inventing the Post it note **YR5**
- Ruth Mary Rogan Benerito (1916 –2013) was an American chemist and inventor known for her work related to the textile industry, notably including the development of wash-and-wear cotton fabrics – invented wrinkle –free cotton. **YR5**
- John Boyd Dunlop (1840 – 1921) – invented the the pneumatic tyre **YR2**
- John Loudon McAdam (1756 –1836) Scottish civil engineer and road-builder. He was the inventor of "macadamisation", an effective and economical method of constructing roads **YR2**
- Charles Macintosh (1766- 1843), Scottish chemist, best known for his invention in 1823 of a method for making waterproof garments **YR2**
- Alfred Barnhard Nobel (1833-1896) is best known for his invention of dynamite and an explosive device and for founding the Nobel Prizes
- Marie Curie (1867 –1934), was a Polish and naturalized-French physicist and chemist who conducted pioneering research on radioactivity.
- **Walter Lincoln Hawkins (1911 –1992) polymer chemists, scientist and inventor**
best known for inventing a plastic coating for telephone wires that made universal service possible. He is a recipient of the National Medal of Technology and an inductee of the National Inventors Hall of Fame
- **Harry Bhadeshi (b. 1953 -):** If you travel from the UK to France via the channel tunnel, your carriage is riding on rails made of a particular kind of steel that Harry Bhadeshia invented. He has also developed the world's strongest armour, called 'super bainite',

Vocabulary

wood plastic glass metal water rock hard soft shiny dull	hard soft brick paper glass fabric shiny dull rough smooth squash		solid liquid gas state evaporation condensation water cycle temperature material melt	hardness soluble insoluble solubility mixture substance filter sieve evaporate reversible	
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Progression of Skills and Knowledge in Science

rough smooth stretchy strong waterproof transparent (see through)	fold squeeze twist stretch bend elastic foil waterproof absorbent opaque translucent transparent		heat steam	irreversible dissolve solution magnetic	
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Chemistry: Rocks

EYFS/Early Learning Goal

ELG: The Natural World Children at the expected level of development will: - Explore the natural world around them, making observations and drawing pictures of animals and plants; 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; - Understand some important processes and changes in the natural world around them, including the seasons and changing states of matter.

- Use all their senses in hands-on exploration of natural materials.
- Explore collections of materials with similar and/or different properties.
- Explore the natural world around them
- Describe what they see, hear and feel whilst outside

Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
See Yr1 - Everyday materials (2), (3), (4)	See Yr2 - Uses of everyday materials (1)	(1) To compare and group together different kinds of rocks on the basis of their			See Yr6 - Evolution and inheritance (1)

Progression of Skills and Knowledge in Science

		<p>appearance and simple physical properties.</p> <p>(2) To describe in simple terms how fossils are formed when things that have lived are trapped within rock.</p> <p>(3) To recognise that soils are made from rocks and organic matter.</p>			
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Key Scientists/People (Inc. Black, Asian, and minority ethnic)

- Mary Anning (1799 –1847) was an English fossil collector, dealer, and palaeontologist
- Adriana Ocampo (1955 -) Space geologist
- Inge Lehmann (1888-1993) Danish seismologist best known for her discovery of the inner core of Earth in 1936 by using seismic wave data.
- Alfred Wegener (1880 – 1930) – continental drift theory
- Marie Tharp(1920 – 2006) was an American geologist and oceanographer. She helped create an important map of the ocean floor. The map led Tharp to realize that the ocean floor could help prove the scientific theory of continental drift, or the idea that the continents are moving
- Dorothea Bate (1878 – 1951) was a palaeontologist who is internationally recognised for her expertise in fossil mammals
- Zeresenay "Zeray" Alemseged (b. 1969) is an Ethiopian paleoanthropologist who was the Chair of the Anthropology Department at the California Academy of Sciences in San Francisco, United States. He is best known for his discovery, on 10 December 2000, of Selam, also referred to as “Lucy’s child”, the almost-complete fossilized remains of a 3.3 million-year-old child of the species *Australopithecus afarensis*.
- Sanjeev Gupta b. 1965 is a geologist who uses his understanding of rocks and physical processes such as plate tectonics, mountain building, deposition of sediment and erosion by water to understand how particular landscapes were formed from remote deserts, under the sea in the English Channel and on Mars
- Ahmet Mete Işıkara (1941 –2013) was a Turkish geophysicist and earthquake scientist, well known for his efforts to create public awareness of the need for protection and safety during earthquakes

Vocabulary

		<p>fossils</p> <p>soil</p> <p>organic matter</p> <p>igneous</p> <p>sedimentary</p>			
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Progression of Skills and Knowledge in Science

		metamorphic layers permeable hardness granite chalk sandstone marble slate pressure			
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Physics: Seasonal changes

EYFS/Early Learning Goal

ELG: The Natural World Children at the expected level of development will: - Explore the natural world around them, making observations and drawing pictures of animals and plants; 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; - Understand some important processes and changes in the natural world around them, including the seasons and changing states of matter. Explore the natural world around them. Children will:

- Describe what they see, hear and feel whilst outside.
- Understand the effect of changing seasons on the natural world around them.

Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
(1) To know there are changes across the four seasons		See Yr3 - Light (3)		See Yr5 - Earth and space (4)	
(2) To describe the weather associated with the seasons and how day length varies.					

Key Scientists/People (Inc. Black, Asian, and minority ethnic)

- John Dalton (1766 – 1844) – Famous for the amount of time he kept a weather diary for.
- Gabriel Fahrenheit (1686 – 1736) – Inventor of the first modern thermometer.
- Inez Fung (1941 -) – Studies climate change.

Progression of Skills and Knowledge in Science

Vocabulary					
weather spring day rain summer night sunshine autumn dark cloud winter snow bright light warm hot cold					

Physics: Light

EYFS/Early Learning Goal

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- Explore how things work.
- Talk about the differences in materials and changes they notice.
- Describe what they see, hear and feel whilst outside.

Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
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Progression of Skills and Knowledge in Science

See Yr1 - Animals, including humans (4)		<p>(1) To recognise that they need light in order to see things and that dark is the absence of light.</p> <p>(2) To know that light is reflected from surfaces</p> <p>(3) To recognise that light from the sun can be dangerous and that there are ways to protect their eyes.</p> <p>(4) To recognise that shadows are formed when the light from a light source is blocked by a solid object.</p> <p>(5) To find patterns in the way that the size of shadows change</p>			<p>(1) To recognise that light appears to travel in straight lines</p> <p>(2) 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>(3) To know that light travels from light sources to our eyes or from light sources to objects and then to our eyes and this enables us to see things.</p> <p>(4) To use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them.</p>
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Key Scientists/People (Inc. Black, Asian, and minority ethnic)

- James Clerk Maxwell (1831- 1879) is most famous for his theory of electromagnetism, which showed that light was electromagnetic radiation
- Thomas Young (1773 – 1829) – Wave theory of light. Double-slit experiment.
- Sir David Brewster (1781 – 1868) - Deduced ``Brewster's law'' giving the angle of incidence that produces reflected light which is completely polarized; invented the kaleidoscope and the stereoscope, and improved the spectroscope
- Jean-Bernard-Leon Foucault (1819-1868) – Accurately measured the speed of light
- Dr. Mark Richards UK, (1970 -).

He developed equipment that could detect and measure the gases in the air around us. A spectrometer analyses which parts of light can travel through the air.

Progression of Skills and Knowledge in Science

- Dr Willie Hobbs Moore USA (1932 -) Developed spectroscopy is a way of learning about matter and materials by sending light through them and analysing the spectrum of light that they emit.

Vocabulary

		opaque transparent translucent shadow light source reflect shine position. distance			light reflection shadow prism source refraction periscope
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Physics: Forces

EYFS/Early Learning Goal

ELG: The Natural World Children at the expected level of development will: - Explore the natural world around them, making observations and drawing pictures of animals and plants; 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; - Understand some important processes and changes in the natural world around them, including the seasons and changing states of matter.

Children will:

- Explore how things work.
- Explore and talk about different forces they can feel.
- Talk about the differences between materials and changes they notice.
- Explore the natural world around them.
- Describe what they see, hear and feel whilst outside.

Year 1	Year 2	Year 3 (Forces and magnets)	Year 4	Year 5 (Forces)	Year 6
	See Yr2 - Uses of everyday materials (2)	(1) To know and compare how things move on different surfaces (2) To notice that some forces need contact		(1) To know that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object	

Progression of Skills and Knowledge in Science

		<p>between two objects, but magnetic forces can act at a distance</p> <p>(3) To know how magnets attract or repel each other and attract some materials and not others</p> <p>(4) To 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</p> <p>(5) To describe magnets as having two poles</p> <p>(6) To predict whether two magnets will attract or repel each other, depending on which poles are facing.</p>		<p>(2) To identify the effects of air resistance, water resistance and friction, that act between moving surfaces</p> <p>(3) To recognise that some mechanisms, including levers, pulleys and gears, allow a smaller force to have a greater effect.</p>	
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Key Scientists/People (Inc. Black, Asian, and minority ethnic)

- William Gilbert (1544 – 1603) pioneer researcher into magnetism
- Galileo Galilei 1564 - 1642 famous for his work on mathematics and astronomy. YR5
- Isaac Newton 1642 – 20 March 1726 Formulated the laws of motion YR5
- Edward Alexander Bouchet (1852 –1918) was an American physicist and educator and was the first African American to earn a Ph.D. from any American university, completing his dissertation in physics at Yale in 1876.

Vocabulary

Progression of Skills and Knowledge in Science

		attract repel magnetic non-magnetic magnetic field poles gravity push pull surface contact facing		gravity air resistance friction lever water resistance pulley gear mechanism speed	
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Physics: Sound

EYFS/Early Learning Goal

ELG: The Natural World Children at the expected level of development will: - Explore the natural world around them, making observations and drawing pictures of animals and plants; 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; - Understand some important processes and changes in the natural world around them, including the seasons and changing states of matter.

Children will;

- Explore how things work.
- Describe what they see, hear and feel whilst outside.

Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
See Y1 - Animals, including humans (4)			(1) To identify how sounds are made, associating some of them with something vibrating. (2) To recognise that vibrations from sounds travel through a medium to the ear.		

Progression of Skills and Knowledge in Science

			<p>(3) To see patterns between the pitch of a sound and features of the object that produced it.</p> <p>(4) To see patterns between the volume of a sound and the strength of the vibrations that produced it.</p> <p>(5) To recognise that sounds get fainter as the distance from the sound source increases.</p>		
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Key Scientists/People (Inc. BAME)

- Ernst Mach (1838-1916). Described how shock waves are formed.
- Heinrich Hertz (1857-94). The unit of frequency used for all kinds of waves and vibrations is named after him. One Hertz is equal to one vibration per second.

Vocabulary

			<p>sound</p> <p>hear</p> <p>ear</p> <p>vibrate</p> <p>vibration</p> <p>pitch</p> <p>volume</p> <p>pluck</p> <p>blow</p> <p>strike</p> <p>insulator</p>		
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Physics: Electricity

EYFS/Early Learning Goal

ELG: The Natural World Children at the expected level of development will: - Explore the natural world around them, making observations and drawing pictures of animals and plants; 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; - Understand some important processes and changes in the natural world around them, including the seasons and changing states of matter.

Children will:

- Explore how things work.

Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
			<p>(1) To identify common appliances that run on electricity</p> <p>(2) To construct a simple series electrical circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers</p> <p>(3) To know 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>(4) To recognise that a switch opens and closes a circuit and associate this with whether or not</p>		<p>(1) To 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>(2) To 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>(3) To use recognised symbols when representing a simple circuit in a diagram.</p>

Progression of Skills and Knowledge in Science

			<p>a lamp lights in a simple series circuit</p> <p>(5) To recognise some common conductors and insulators, and associate metals with being good conductors.</p>		
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Key Scientists/People (Inc. Black, Asian, and minority ethnic)

- Benjamin Franklin (1706-90). Showed that lightning is caused by electricity.
- Thomas Edison (1847-1931). Inventor of the fuse. 2. Benjamin Franklin (1706-90). Showed that lightning is caused by electricity
- Alessandro Volta (1745-1827). Invented the first battery. The volt, the unit of electromotive force, is named after him.
- Andre-Marie Ampere (1775-1836). His studies allowed people to measure the amount of electric current flowing through a circuit. Thus, the current is measured in units called amperes, or amps for short. One amp is a flow of about 6 million million electrons per second.
- William Kamkwamba (1987 -) Inventor and author, William Kamkwamba was born in Malawi in 1987. Electricity/Wind turbines

Vocabulary

			<p>cell battery bulb wire switch buzzer circuit electricity mains lamp appliance volt conductor insulator</p>		<p>Circuit complete circuit circuit diagram circuit symbol cell battery bulb buzzer motor switch voltage</p>
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Physics: Earth and space

EYFS/Early Learning Goal

ELG: The Natural World Children at the expected level of development will: - Explore the natural world around them, making observations and drawing pictures of animals and plants; 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; - Understand some important processes and changes in the natural world around them, including the seasons and changing states of matter.

Children will:

- Explore the natural world around them.
- Describe what they see, hear and feel whilst outside.

Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
See Yr1 - Seasonal changes (1), (2)				<p>(1) To describe the movement of the Earth, and other planets, relative to the Sun in the solar system.</p> <p>(2) To describe the movement of the Moon relative to the Earth.</p> <p>(3) To describe the Sun, Earth and Moon as approximately spherical bodies.</p> <p>(4) 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>	

Key Scientists/People (Inc. Black, Asian, and minority ethnic)

- Aristarchus (310 – 230 B.C.). He was the first to figure out that the Earth travels around the Sun.
- Nicolas Copernicus (1473 – 1543). Had the idea that Earth revolves on its axis and the Earth and other planets orbit around the Sun YR5
- Claudius Ptolemy (100-170 AD), developed a Geocentric Solar System which placed the “stellar” universe on a crystal sphere. Earth stood still (didn't rotate) and the Sun orbited Earth, producing our day and night cycles. YR5
- Galileo Galilei (1564 – 1642). Discovered four of Jupiter's moons. In 1609 was the first person to make a study of the skies with a telescope.
- Alhazen (c. 965 – c. 1040) was a Muslim Arab mathematician, astronomer, and physicist of the Islamic Golden Age. Referred to as "the father of modern optics" YR5
- Edwin Hubble (1889-1953). In 1924 Hubble showed that nebulae (fuzzy light patches in the sky) were distant galaxies. In 1929 he found the speed of galaxy moves away from the Earth depends on its distance from the Earth. If a galaxy is four times as far away as another, it is moving four times as fast. This is Hubble's law.
- William Huggins. Showed that stars are made up of the same elements that exist on Earth.
- Cecilia Payne-Gaposchkin (1900-79). In the 1920's she proved that stars are made mostly of hydrogen.
- Arthur Eddington (1882- 1944). He was the first to work out what the inside of a star was like.
- Professor Brian Cox (1968 -) Contemporary physicist, presents many BBC programmes)
- 10. Heidi Hammel (1960 -) Astronomer
- Guion Bluford – (b.1942 -)USA - Became the first African American person in space in 1983.
- Professor Clifford Johnson – (b.1968 -) is a scientist, writer and science communicator. He was born in London and raised for 10 years in the Caribbean. Works involves investigating space-time, black holes, the big bang and extra dimensions,
- Dr Maggie Aderin-Pocock (1968 -)She is a British space scientist and science educator who is well known for her role presenting the BBC television programme, The Sky at Night.
- Dr Claudia Alexander Claudia (1959 -). She was fascinated by physics and became a specialist in planetary science
- Dr Neil deGrasse Tyson (1958- is an American astrophysicist, cosmologist and planetary scientist.
- Mae Carol Jemison (1956-)American engineer, physician and NASA astronaut, became the first African American woman to travel in space when she went into orbit aboard the Space Shuttle Endeavour on September 12, 1992
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Vocabulary

				sphere orbit	
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Progression of Skills and Knowledge in Science

				<div>rotate rotation planet star moon asteroid satellite meteor meteorite comet surface tide gravity phase mass horizon sunrise sunset</div>	
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