

Science

Progression of Knowledge



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| Progression in EYFS |
| UNDERSTANDING THE WORLD: The World  |
| 3-4 Years | 4-5 Years | ELG |
| * Begin to make sense of their own life-story and family’s history.
* Understand the key features of the life cycle of a plant and an animal.
* Explore collections of materials with similar and/or different properties.
* Explore and talk about different forces they can feel.
* Talk about the differences between materials and changes they notice.
* Plant seeds and care for growing plants.
* Begin to understand the need to respect and care for the natural environment and all living things.
* Talk about what they see, using a wide vocabulary.
* Show interest in different occupations, e.g. scientists
* Explore how things work.
* Use all their senses in hands-on exploration of natural materials.
 | * Recognise some environments that are different to the one in which they live.
* Understand the effect of changing seasons on the natural world around them.
* Describe what they see, hear and feel whilst outside.
* Explore the natural world around them.
 | * Talk about the lives of the people around them and their roles in society, e.g. dentist, doctor, vet, astronaut
* 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.
* Describe their immediate environment using knowledge from observation, discussion, stories, non-fiction texts and maps.
* Explore the natural world around them, making observations and drawing pictures of animals and plants.
* Understand some important process and changes in the natural world around them, including the seasons and changing states of matter.
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| Topic | Year 1 | Year 2 | Year 3 | Year 4 | Year 5 | Year 6 | KS3 |
| **BIOLOGY**Plants | * Identify and name a variety of common wild and garden plants, including deciduous and evergreen trees
* • Identify and describe the basic structure of a variety of common flowering plants, including trees
 | •Observe and describe how seeds and bulbs grow into mature plants •Find out and describe how plants need water, light and a suitable temperature to grow and stay healthy. | •Identify and describe the functions of different parts of plants; roots, stem, leaves and flowers. •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. •Investigate the ways in which water is transported within plants. •Explore the role of flowers in the life cycle of flowering plants, including pollination, seed formation and seed dispersal |  | **AS PART OF LIVING THINGS AND THEIR HABITATS TOPIC**•Describe the life process of reproduction in some plants and animals |  | Pupils in KS3 will be taught about:\* reproduction in plants, including flower structure, wind and insect pollination, fertilisation, seed and fruit formation and dispersal, including quantitative investigation of some dispersal mechanisms. |

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| **BIOLOGY**Animals including Humans | •Identify and name a variety of common animals that are birds, fish, amphibians, reptiles and mammals •Identify and name a variety of common animals that are carnivores, herbivores and omnivores. •Describe and compare the structure of a variety of common animals (birds, fish, amphibians, reptiles and mammals, and including pets).•Identify, name draw and label the basic parts of the human body and say which parts of the body is associated with each sense. | •Notice that animals, including humans, have offspring which grow into adults •Find out about and describe the basic needs of animals, including humans, for survival (water, food and air) •Describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene | •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 •Identify that humans and some animals have skeletons and muscles for support, protection and movement. | •Describe the simple functions of the basic parts of the digestive system in humans •Identify the different types of teeth in humans and their simple functions •Construct and interpret a variety of food chains, identifying producers, predator | •Describe the changes as humans develop from birth to old age. | •Identify and name the main parts of the human circulatory system, and explain the functions of the heart, blood vessels and blood •Recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function •Describe the ways in which nutrients and water are transported within animals, including humans. | Pupils In KS3 will be taught about:\* the consequences of imbalances in the diet, including obesity, starvation and deficiency diseases\* the effects of recreational drugs (including substance misuse) on behaviour, health and life processes.\*the structure and functions of the gas exchange system in humans, including adaptations to function\*the mechanism of breathing to move air in and out of the lungs\* the impact of exercise, asthma and smoking on the human gas exchange system. |

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| **BIOLOGY**Living Things and their Habitats |  | •Explore and compare the differences between things that are living, dead, and things that have never been alive •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. •Identify and name a variety of plants and animals in their habitats, including micro - habitats •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. |  | •Recognise that living things can be grouped in a variety of ways •explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment •Recognise that environments can change and that this can sometimes pose dangers to living things | •Describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird •Describe the life process of reproduction in some plants and animals. | •Describe how living things are classified into broad groups according to common observable characteristics and based on similarities and differences, including micro - organisms, plants and animals •Give reasons for classifying plants and animals based on specific characteristics | Pupils in Key Stage 3 will be taught about:\* differences between species  |

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| **BIOLOGY**Evolution and Inheritance |  | **AS PART OF LIVING THINGS AND THEIR HABITATS TOPIC*** 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
 | **AS PART OF ROCKS TOPIC*** Describe in simple terms how fossils are formed when things that have lived are trapped within rock
 | **AS PART OF LIVING THINGS AND THEIR HABITATS TOPIC*** Recognise that environments can change and that this can sometimes pose dangers to living thing
 |  | •Recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago. •Recognise that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents •Identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution. | Pupils in Key Stage 3 will be taught about:* heredity as the process by which genetic information is transmitted from one generation to the next
* a simple model of chromosomes, genes and DNA in heredity, including the part played by Watson, Crick, Wilkins and Franklin in the development of the DNA model
* the variation between species and between individuals of the same species means some organisms compete more successfully, which can drive natural selection
* changes in the environment may leave individuals within a species, and some entire species, less well adapted to compete successfully and reproduce, which in turn may lead to extinction
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| **CHEMISTRY**Materials/Rocks/States of Matter | •Distinguish between an object and the material from which it is made. •Identify and name a variety of everyday materials, including wood, plastic, glass, water and rock. •Describe the simple physical properties of a variety of everyday materials. •Compare and group together a variety of everyday materials on the basis of their physical properties. | •Identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses •Find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching. | •Compare and group together different kinds of rocks on the basis of their appearance and simple physical properties •Describe in simple terms how fossils are formed when things that have lived are trapped within rock •Recognise that soils are made from rocks and organic matter. | •Compare and group materials together, according to whether they are solids, liquids or gases •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) •Identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature. | •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 •Understand that some materials will dissolve in liquid to form a solution, and describe how to recover a substance from a solution •Use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating •Give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic •Demonstrate that dissolving, mixing and changes of state are reversible changes •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 and the action of acid on bicarbonate of soda . |  | Pupils in Key Stage 3 will be taught about:* chemical reactions as the rearrangement of atoms
* representing chemical reactions using formulae and using equations
* combustion, thermal decomposition, oxidation and displacement reactions
* defining acids and alkalis in terms of neutralisation reactions
* the pH scale for measuring acidity/alkalinity; and indicators
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| **PHYSICS**Light  |  |  | •Recognise that they need light in order to see things and that dark is the absence of light •Notice that light is reflected from surfaces •Recognise that light from the sun can be dangerous and that there are ways to protect their eyes •Recognise that shadows are formed when the light from a light source is blocked by a solid object •Find patterns in the way that the sizes of shadows change. |  |  | •Recognise that light appears to travel in straight lines •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 •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 •Use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them | Pupils in Key Stage 3 will be taught about:* the similarities and differences between light waves and waves in matter
* light waves travelling through a vacuum; speed of light
* the transmission of light through materials: absorption, diffuse scattering and specular reflection at a surface
* use of ray model to explain imaging in mirrors, the pinhole camera, the refraction of light and action of convex lens in focusing (qualitative); the human eye
* light transferring energy from source to absorber leading to chemical and electrical effects; photo-sensitive material in the retina and in cameras
* colours and the different frequencies of light, white light and prisms (qualitative only); differential colour effects in absorption and diffuse reflection.
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| **PHYSICS**Sound |  |  |  | •Identify how sounds are made, associating some of them with something vibrating •Recognise that vibrations from a sound travel through a medium to the ear. •Find patterns between the pitch of a sound and features of the object that produced it •Find patterns between the volume of a sound and the strength of the vibrations that produced it. •Recognise that sounds get fainter as the distance from the sound source increases |  |  | Pupils in KS3 will be taught:* About waves on water as undulations which travel through water with transverse motion; these waves can be reflected, and add or cancel – superposition
* That frequencies of sound waves are measured in hertz (Hz) and about echoes, reflection and absorption of sound
* That sound needs a medium to travel
* Sound is produced by vibrations of objects in loud speakers, detected by their effects on microphone, diaphragm and the ear drum;
* Sound waves are longitudinal
* About the auditory range of humans and animals
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| **PHYSICS**Forces and Magnets |  |  | •Compare how things move on different surfaces •Notice that some forces need contact between two objects, but magnetic forces can act at a distance •Observe how magnets attract or repel each other and attract some materials and not others •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 •Describe magnets as having two poles •Predict whether two magnets will attract or repel each other, depending on which poles are facing. |  | •Explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object •Identify the effects of air resistance, water resistance and friction, that act between moving surfaces •Recognise that some mechanisms, including levers, pulleys and gears, allow a smaller force to have a greater effect. |  | Pupils in Key Stage 3 will be taught about:* forces as pushes or pulls, arising from the interaction between two objects
* using force arrows in diagrams, adding forces in one dimension, balanced and unbalanced forces
* moment as the turning effect of a force
* forces: associated with deforming objects; stretching and squashing – springs; with rubbing and friction between surfaces, with pushing things out of the way; resistance to motion of air and water
* forces measured in newtons, measurements of stretch or compression as force is changed
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| **PHYSICS**Earth and Space | **AS PART OF SEASONAL CHANGES TOPIC*** Observe changes across the four seasons
* Observe and describe weather associated with the seasons and how day length varies.
 |  |  |  | •Describe the movement of the Earth, and other planets, relative to the Sun in the solar system •Describe the movement of the Moon relative to the Earth •Describe the Sun, Earth and Moon as approximately spherical bodies •Use the idea of the Earth’s rotation to explain day and night and the apparent movement of the Sun across the sky |  | Pupils in Key Stage 3 should be taught about:* gravity force, weight = mass x gravitational field strength (g), on Earth g=10 N/kg, different on other planets and stars; gravity forces between Earth and Moon, and between Earth and Sun (qualitative only)
* our Sun as a star, other stars in our galaxy, other galaxies
* the seasons and the Earth’s tilt, day length at different times of year, in different hemispheres

the light year as a unit of astronomical distance. |

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| **PHYSICS**Electricity |  |  |  | •Identify common appliances that run on electricity •Construct a simple series electrical circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers •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 •Recognise that a switch opens and closes a circuit and associate this with whether or not a lamp lights in a simple series circuit •Recognise some common conductors and insulators, and associate metals with being good conductors. |  | •Associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit •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 •Use recognised symbols when representing a simple circuit in a diagram. | Pupils in Key Stage 3 will be taught about:* electric current, measured in amperes, in circuits, series and parallel circuits, currents add where branches meet and current as flow of charge
* potential difference, measured in volts, battery and bulb ratings; resistance, measured in ohms, as the ratio of potential difference (p.d.) to current
* differences in resistance between conducting and insulating components (quantitative).
* Static electricity
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