Science - Progression of Knowledge and Skills

Early Years Foundation Stage (Early Learning Goals)

ELG: 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.

Key Stage 1

Working Scientifically

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.

Key Stage 2 (3+4)

Working Scientifically

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.

Key Stage 2 (5+6)

Working Scientifically

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.

Strand	EYFS	Year 1 (Seasonal changes)	Year 2 Living Things and their Habitats	Year 3	Year 4 All Living Things	Year 5 All Living Things and Their Habitats	Year 6 All Living Things and Their Habitats	Key Stage 3
All Living Things		observe changes across the 4 seasons observe and describe weather associated with the seasons and how day length varies	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 microhabitats 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.	Reproduction in humans (as an example of a mammal), including the structure and function of the male and female reproductive systems, menstrual cycle (without details of hormones), gametes, fertilisation, gestation and birth, to include the effect of maternal lifestyle on the foetus through the placenta. Reproduction in plants, including flower structure, wind and insect pollination, fertilisation, seed and fruit formation and dispersal, including quantitative investigation of some dispersal mechanisms. Differences between species.
All Living Things Vocabulary Progression		season Summer Winter Autumn Spring day/daytime night/night-time weather wind/windy rain/rainy snow/snowy hail fog sun/sunny hot warm cold	living dead alive habitat (environment) depend/rely food source food chain		variation variety classification classification key environment characteristics environmental change habitat organism affect/effect (verb/noun) human activity pollution building/construction	life cycle mammal amphibian insect bird reproduction reproduce life processes organism reproduce sexually reproduce asexually evolve	classification classify micro-organisms vertebrate invertebrate insect arachnid mollusc myriapod mammal bird reptile amphibian fish	

Strand	EYFS	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Key Stage 3
Animals Including Humans		identify and name a variety of common animals including, fish, amphibians, reptiles, birds 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 (fish, amphibians, reptiles, birds and mammals including pets) identify, name, draw and label the basic parts of the human body and say which part 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 other 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, predators and prey.	describe the changes as humans develop to old age.	identify and name the main parts of the human circulatory system, and describe 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.	Reproduction in humans (as an example of a mammal), including the structure and function of the male and female reproductive systems, menstrual cycle (without details of hormones), gametes, fertilisation, gestation and birth, to include the effect of maternal lifestyle on the foetus through the placenta. 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
Animals Including Humans Vocabulary Progression		fish amphibian (frog) reptile (snake) bird (robin, seagull, pigeon) mammal (cat, dog, fox, human) carnivore herbivore omnivore meat	offspring survive survival water food air/oxygen exercise healthy maturity (adult) grow reproduce	nutrition nutrients minerals vitamins carbohydrates protein joint muscle skeleton skull spine/backbone	digestive system tongue oesophagus saliva large intestine small intestine stomach colon rectum faeces pancreas	mature maturity birth infancy adolescence adulthood old age death	circulatory system heart blood vessels artery vein lungs lifestyle nutrients impact pump absorbed	

		plant head neck arm elbow leg knee face ear eye hair mouth teeth see hear smell touch taste	die/death	rib support protect/ion movement	liver nutrients water vitamins minerals carbohydrates protein teeth molar incisor canine food chain primary consumer secondary consumer carnivore herbivore omnivore producers prey predator		muscle	

Strand	EYFS	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Key Stage 3
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		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	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.
Electricity Vocabulary Progression					electricity appliance series circuit cell wire switch bulb buzzer conduct/conductor insulate/insulator electrocute electricity source mains electricity complete circuit		complete circuit cell battery voltage current component/device	

Strand	EYFS	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Key Stage 3
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 size 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	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.
Light Vocabulary Progression				light dark surface reflect/reflection light source shadow block/blocked light beam transparent opaque translucent			reflect reflection light source shadow iris retina lens	

Strand	EYFS	Year 1 Everyday Materials	Year 2 Uses of Everyday Materials	Year 3 Rocks	Year 4 States of Matter	Year 5 Properties of Everyday Materials	Year 6	Key Stage 3
Materials		distinguish between an object and the material from which it is made identify and name a variety of everyday materials, including wood, plastic, glass, metal, 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 simple physical properties	identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for different uses compare how things move on different surfaces. 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 know 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.		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.

Materials Vocabulary Progression		object material wood plastic metal water glass rock (brick) paper fabric elastic hard soft stretchy stiff (hard) shiny dull rough smooth bendy/not bendy waterproof/ not waterproof absorbent/not absorbent	suitable/suitability material squash bend twist stretch force property	rock igneous sedimentary metamorphic soil organic matter fossil absorb texture permeable non-permeable permeability chalk marble granite	solid liquid gas change state heated cooled temperature degrees Celsius evaporate evaporation condense condensation precipitation water cycle melt freeze substance mass	properties soluble/solubility transparent/ transparency conductivity (electrical and thermal definition) solid liquid gas dissolve solution substance mixture separate filter sieve evaporate reversible change irreversible change change of state		

Strand	EYFS	Year 1 Plants	Year 2 Plants	Year 3 Plants	Year 4 All Living Things Plants	Year 5 All Living Things and Their Habitats Plants	Year 6 All Living Things and Their Habitats Plants	Key Stage 3
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 flowering plants: roots, stem/trunk, 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 way in which water is transported within plants explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal	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.	Reproduction in plants, including flower structure, wind and insect pollination, fertilisation, seed and fruit formation and dispersal, including quantitative investigation of some dispersal mechanisms.
Plants Vocabulary Progression		tree flower leaf stem petal trunk branch root fruit wild garden evergreen deciduous	seed bulb mature (grow) light suitable adapt (change) habitat (environment) produce (make) generations (period of time) temperature	function root stem trunk leaves petal flowers nutrients moisture soil transport/transported (water) life cycle seed/bulb pollinate/pollination germinate/ germination fertilise/fertilisation seed dispersal reproduce carbon dioxide	variation variety classification classification key environment characteristics environmental change habitat organism affect/effect (verb/noun) human activity pollution building/construction	life cycle mammal amphibian insect bird reproduction reproduce life processes organism reproduce sexually reproduce asexually evolve	classification classify micro-organisms vertebrate invertebrate insect arachnid mollusc myriapod mammal bird reptile amphibian fish	

Strand	EYFS	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Key Stage 3
Sound					identify how sounds are made, associating some of them with something vibrating recognise that vibrations from sounds 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			Waves on water as undulations which travel through water with transverse motion; these waves can be reflected, and add or cancel – superposition. Frequencies of sound waves, measured in Hertz (Hz); echoes, reflection and absorption of sound. Sound needs a medium to travel, the speed of sound in air, in water, in solids. Sound produced by vibrations of objects, in loud speakers, detected by their effects on microphone diaphragm and the ear drum; sound waves are longitudinal. Auditory range of humans and animals. Pressure waves transferring energy; use for cleaning and physiotherapy by ultra-sound. Waves transferring information for conversion to electrical signals by microphone.
Sound Vocabulary Progression					sound vibrate/vibration sound wave pitch volume sound source distance faint/er			

Strand	EYFS	Year 1	Year 2	Year 3 Forces and magnets	Year 4	Year 5	Year 6	Key Stage 3
Forces				compare how things move on different surfaces notice that some forces need contact between 2 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 2 poles predict whether 2 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		Magnetic fields by plotting with compass, representation by field lines Earth's magnetism, compass and navigation. 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.
Forces Vocabulary Progression				magnet magnetic non-magnetic metal attract/attraction repel pole north/south push pull contact non-contact mass		force push pull gravity air resistance water resistance friction resistance mechanism lever pulley gear motion		

Strand	EYFS	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Key Stage 3
Seasonal Changes **Earth and Space**		observe changes across the 4 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.		The seasons and the Earth's tilt, day length at different times of year, in different hemispheres. 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.
Seasonal Changes **Earth and Space** **Vocabulary Progression**		season Summer Winter Autumn Spring day/daytime night/night-time weather wind/windy rain/rainy snow/snowy hail fog sun/sunny hot warm cold				Earth Sun Moon planet star solar system spherical body rotation axis orbit year (365 days ¼) lunar month leap year gravity gravitational pull mass force		