Science

Curriculum overview

All children are entitled to a curriculum and to the powerful knowledge which will open doors and maximise their life chances. Below is a high-level overview of the critical knowledge children will learn in this particular subject, at each key stage from Reception through to Year 13, in order to equip students with the cultural capital they need to succeed in life. The curriculum is planned vertically and horizontally giving thought to the optimum knowledge sequence for building secure schema.

Knowledge, skills and understanding to be gained at each stage*

		Cycle 1	Cycle 2	Cycle 3
EYFS	**Knowledge introduced**	All about me Naming simple body parts, identifying parts of a skeleton, self- care and hygiene, naming planet earth and the sun and moon, British Wildlife (linked to Autumn) Winter and Space Materials: investigating water/ice, arctic animals and their habitats, magnetic materials, exploring chemical reactions (baking soda)	Under the Sea Exploring materials that float and sink, exploring waterproof materials, naming sea life and exploring sea life habitats Spring and gardening Egg to chick, animals and their babies, naming simple plants, discussing what plants need to grow and live, experimenting with plants	Summer and shadows Difference between night and day, light and dark, exploring shadows, measuring weather Animals and their habitats Comparing British wildlife to Asian animals, comparing British habitats to Asian habitats.
	Skills introduced	Question words to ask questions; how to observe closely; how to notice patterns; how to sort and group; how to care for living things; how to dress, go to the toilet, wash hands and brush teeth	How to describe what they see; fair/not fair (when adults are helping with investigations); how to use books to find more information	How to compare similarities and differences scientifically; how to care for animals; basic recording - tally charts
	Knowledge revisited	n/a	Parts of plants, seasonal change	Seasonal change, parts of animals
	Skills revisited	n/a	Caring for living things, observing scientifically; asking questions about the world they live in	Caring for living things; observing scientifically; asking questions; hygiene skills
Year 1	**Knowledge introduced**	Bodies and Senses Draw and label basic parts of the human body; understand the five senses and associated body parts Animals Describe structures of animals (e.g. gills, claws, scales, tentacles, antennae, fins, skin, hair, fur, tail, feathers, skeleton, whiskers, segments); name common animals; understand key features of different families of common animals within the broad groups of mammals, reptiles, amphibians, fish, birds (students do not need to classify into these groups yet); identify carnivores, herbivores and omnivores	Everyday Materials Identify and sort everyday materials by their physical properties; use properties to describe materials, including wood, plastic, glass, fabric, metal and rock; identify materials which are transparent and opaque Experimenting with Materials How to answer our own scientific questions; experimenting with materials; reporting scientific findings	Plants Identify and name common wild and garden plants, including deciduous and evergreen trees; describe the structure of common flowering plants and trees; identify fruits and vegetables Gardening Planting and caring for bulbs and seeds, including flowers; identify fruits and vegetables observing how plants grow over time; reporting scientific findings
		Seasonal Changes		

	Observe changes across the four seasons; describe weather associated with the seasons and how day length varies; how plants in our local environment change across the seasons; (skill: use thermometers to compare temperatures throughout the seasons)			
	Skills introduced	Ask simple scientific questions; observe closely, using simple equipment (e.g. hand lenses); fair tests; classifying using Venn diagrams; block graphs; 1st scientific investigation (linked to senses)	Perform simple tests; make basic predictions; identifying and classifying using scientific vocabulary; using simple equipment (e.g. timers), block graphs; tables of results	Use observations and ideas to suggest answers to questions; identifying properties; using simple equipment (e.g. tape measures/rulers)
	Knowledge revisited	Describing myself, Animals (invertebrates and chicks)	Five senses; materials (water)	Making basic predictions; describing observations, taking care of living things
	Skills revisited	Question words; tally charts, observational skills; fair or not fair; sorting and grouping	Asking simple scientific questions, use resources responsibly; observing closely; sorting & grouping	Making basic predictions; describing observations, taking care of living things
Year 2	**Knowledge introduced**	Living Things and their Habitats (Local) Differences between things that are living, dead, and have never been alive; 7 processes of living things; describe how different habitats provide for the basic needs of different kinds of animals; name a variety of animals in their habitats, including microhabitats Everyday Materials Identify everyday materials and explain how their uses relate to their properties; explore how the shapes of solid objects made from some materials can be changedby squashing, bending, twisting and stretching; natural, man made and recyclable materials; inventions of Charles Macintosh	Food chains & Keeping Healthy How animals obtain food from other animals; simple food chains; sources of food; importance of a healthy diet, exercise, good hygiene Animals including Humans Animals, including humans have offspring which grow into adults; describe the basic needs of animals for survival; observations of how animals grow (e.g. life cycle of a butterfly)	Plants Identify common seeds and bulbs; flowering plant life cycle; conditions for germination; describe how plants need air, water, light and a suitable temperature to grow and stay healthy Living Things and their Habitats (Worldwide) Comparing habitats: seashore, woodland, ocean, rainforest; global warming; human impact on habitats
	Skills introduced	Use different types of scientific enquiry to gather and record data; notice similarities, differences and patterns; draw food chains	How to carry out simple comparative tests; using simple equipment to gather data, where appropriate to answer questions	Observe changes over time; find out information using secondary sources of information
	Knowledge revisited	Common animals; similarities between living things; animal diet; life processes; habitats	Properties of common materials; group materials by their physical properties	Structure of common plants; life cycles; seasons and climate
	Skills revisited	Scientific observation; asking and answering scientific questions; identifying and classifying; grouping	Scientific observations; recording observations; comparing materials using scientific vocabulary; describe changes	Interpreting basic information; classifying, identifying and sorting; using simple equipment (e.g thermometer, ruler)
Year 3	**Knowledge introduced**	Animals including Humans Muscle types; functions of a skeleton; naming bones; types of skeleton; types of nutrition Key Scientist: Dian Fossey Light Light sources; how light is reflected from surfaces; sun	Rocks and Soils Give examples of and describe igneous, sedimentary and metamorphic rock; formation of fossils; formation of soil; structure of the earth Key Scientists: Charles Darwin; George Washington Carver	Plants Naming different parts of flowering plants; explore what plans need for life and growth; the importance flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal; how

		safety and ways to protect; formation of shadows; how distance from the light source affects shadows Key Scientist: Thomas Young	Forces and Magnets Describe forces including gravity, friction, magnetic forces; sort magnetic and non-magnetic materials; describe magnetic attraction; identify forces on different objects (pushing and pulling) Key Scientist: Galileo Galilei	water is transported within plants Key Scientist: Agnes Arber How Science Works Plan an investigation linked to student interest, display an analyse the results, revise key learning
	Skills introduced	Set up experiments independently, according to a method; ask relevant questions and using different types of scientific enquiries to answer them	Identify differences, similarities or changes related to simple scientific ideas and processes; accurately read scales; use standard units	Dissect parts of a plant
	Knowledge revisited	Parts of the human body; five senses; skeleton; healthy lifestyles	Basic properties of an object	Flowering plants; elements required for growth; importance of water
	Skills revisited	Labelling; observing changes	Compare and classify by properties	Identify differences and similarities; record findings using scientific language
Year 4	**Knowledge introduced**	Electricity Common appliances that use electricity; mains and battery; construct a simple series circuit; identify and use cells, bulbs, switches and buzzers; different ways of generating electricity; common conductors and insulators; potential electrical safety hazards in the home Key Scientist: Thomas Edison States of Matter Identify everyday solids, liquids and gases by their properties; changes of state via melting and freezing; measuring temperature in degrees Celsius; water cycle; evaporation and condensation Key Scientist: Humphry Davy	Sound How sounds are made through vibration; explore how sounds travel in solids, liquids and gases; differences between pitch and volume; relationship between sounds and distance; anatomy of the ear Key Scientist: Alexander Graham Bell; James West Living Things and Their Habitats: Animals Classification keys to sort, group, identify and name a variety of living things in the local and wider environment; climate change, environmental activism; changes to environments and possible effects: deforestation, invasive species, pollution; endangered animals Key Scientist: Stuart Pimm; Greta Thunberg	Animals including Humans Functions of the human digestive system; different types of teeth in humans and their functions; construct and interpret food chains, identifying producers, predators and prey Key Scientist: Marie Maynard Daly Living Things and Their Habitats: Plants Sort plants into the categories: flowering plants (including grasses) and non-flowering plants (ferns, algae and mosses); describe the functions of parts of a flowering plant Key Scientist: Rachel Carson
	Skills introduced	Using scientific evidence to answer questions and support findings; using simple electrical equipment; how to use a data logger; scaled scientific drawing	Accurate annotations; suggest improvements to an investigation, using evidence; make predictions for new values	Use and create classification keys; present information using labelled graphs
	Knowledge revisited	Conductors and insulators; properties of materials; effect of temperature; light; why materials change state; importance of water	States of matter; parts of the human body; five senses; protection of hearing flowering plants and their life cycles; effect of the local environment	Parts of the human body; teeth; taste; impact of diet; food chains; carnivores, omnivores and herbivores; habitats; changing environments; living things in the local environment
	Skills revisited	Classifying and sorting; using standard units of measure	Set up practical enquiries; dissection of plants;	Report on findings, including oral and written explanations

Year 5	**Knowledge introduced**	Earth and Space Movement of the Earth and other planets, relative to the Sun; describe the movement of the Moon relative to the Earth, concept of the Earth, Sun and Moon as spherical bodies; explain day and night by describing the Earth's rotation around the Sun; name the 8 planets in our solar system; the acceptance of the heliocentric model Key Scientist: Mae Jemison Forces Describe different forces acting on an object; gravity; air resistance; water resistance; friction; forces in mechanisms (levers, pulleys and gears) Key Scientist: Isaac Newton	Properties of Materials Compare and group everyday materials based on their properties and response to magnets; thermal conductors and insulators; electrical conductors Key Scientist: Spencer Silver Changes of Materials Dissolving and separating mixtures; filtration, sieving and evaporation; reversible and irreversible changes, including burning Key Scientist: John Dalton	Living Things and Their Habitats Life process of asexual and sexual reproduction in plants; compare life cycle of plants in the local environment with other plants around the world; types of seed dispersal Key Scientist: Jane Goodall; Ernest Everett Just Animals including Humans Life cycles of a mammal, an amphibian, an insect and a bird; human development stages; life process of reproduction in some animals; puberty; gestation periods of some mammals Key Scientist: David Attenborough
	Skills introduced	Recognising and controlling variables	Set up comparative and fair tests; evaluate the consequences of an unfair test	Form evidenced-supported arguments; refute ideas using evidence
	Knowledge revisited	Magnetism; different forces on an object; friction; pushing and pulling	Everyday materials and their impact on the quality of sound; uses of everyday materials; dissolving and mixing; reversible changes; properties of materials	Life cycles of plants and animals; impact of the local environment; human development; adaptation
	Skills revisited	Scaled drawing; using scientific equipment to take measurements, with increasing accuracy and precision	Using classification keys; comparing and exploring a broad range of materials; using data loggers	Dissection of plants; identify and classify common plants and animals
Year 6	**Knowledge introduced**	Living Things and Their Habitats The work of Carl Linnaeus and the Linnaeus system; describe how living things (plants, animals, microorganisms) are classified into broad groups using observable and common characteristics; understand that these broad groups can be further sub divided; identify similarities and differences between living things and use these to help to classify; explain why plants and animals have been classified into certain groups and sub-groups Key Scientists: Carl Linnaeus; Emmett Chappelle Light Light appears to travel in straight lines; reflection and refraction of light; prisms; spectrum of light; how the angle of the light source affects shadows; seeing colours; the law of reflection; Key Scientist: Albert Einstein	Evolution and Inheritance Adaptation; inheritance; variation; theory of evolution; how fossils support the theory of evolution; human inherited and environmental characteristics Key Scientists: Charles Darwin; Alfred Wallace Electricity Relationship between the brightness of a bulb with the number and voltage of cells in a circuit; recognise electricity symbols; reasons for variations in how circuits function Key Scientist: Michael Faraday; Benjamin Franklin	Animals including Humans Main parts of the human circulatory system, including heart, blood vessels and blood; transportation of water and nutrients; healthy life styles; impact of diet; impact of exercise; impact of drugs and alcohol, including smoking Key Scientist: Charles Drew How Science Works Development of scientific theories; plan an investigation linked to student interest, display and analyse the results; revise key learning Key Scientist: the importance of BAME scientists, and why more are needed

	Skills introduced	Importance of the travel of light in everyday life (rear-view mirrors on cars, periscopes) Drawing light rays	Identify patterns in data; separate opinion from fact	Use secondary sources of information to support primary findings; evaluate the trustworthiness of sources
	Knowledge revisited	Light sources; reflection; shadows; electrical insulators; series circuits; switches, bulbs, buzzers and motors	Classification systems; grouping living things; fossils; how living things have changed over time	Main body parts and internal organs (skeletal, muscular and digestive system)
	Skills revisited	Scaled drawing, with labels; identify common electrical circuit components	Group and classify; use and create classification keys	Create graphs, with labelled scales, of increasing complexity

*A powerful, knowledge-rich curriculum teaches both declarative knowledge (facts; knowing that something is the case; what we think about) and non-declarative or procedural knowledge (skills and processes; knowing how to do something; what we think with). There are no skills without bodies of knowledge to underpin them.

In some subjects, a further distinction can be made between substantive knowledge (the domain specific knowledge accrued e.g. knowledge of the past) and disciplinary knowledge (how the knowledge is accrued e.g. historical reasoning).

Please refer to the DAT Curriculum Principles, published on our website, for further information about how we have designed our all-through curriculum.