

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 11, 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
YEAR 1	<p>Seasons Summer and autumn</p> <p>All about me Body parts; seeing; smelling; tasting; touching; hearing</p> <p>Animals Grouping animals; compare the structure of common animals; carnivores; herbivores and omnivores</p>	<p>Seasons Winter and spring</p> <p>Everyday materials Identify and sort everyday materials; describing properties of everyday materials; waterproof / not waterproof; opaque / transparent; and stretchy / not stretchy <i>Investigation: which material is the most waterproof?</i></p>	<p>Seasons Spring and summer</p> <p>Our local area plants Naming common plants including flowers and trees; gardening; identifying fruits and vegetables; parts of the plant</p>
YEAR 2	<p>Animals including humans Animal babies; growing and changing; basic needs; healthy eating; exercise; keeping clean</p> <p>Everyday materials Identifying everyday materials and their uses; recycling; discovering new materials; suitability of different materials for uses; absorbent / not absorbent <i>Investigation: three little pigs' houses</i></p>	<p>Plants Observing plants; seeds and bulbs; life cycles; what do plants need; plants we eat; how different plants grow; life cycle of a bean plant throughout the year; compare a sunflower and a narcissus plant</p> <p>The environment Climate change; reduce; reuse; recycle; energy experts; water useage; endangered animals; rain forests</p>	<p>Living things and their habitats Sorting living; dead; never alive; exploring local environment and British habitats; research world habitats; sources of food for plants; herbivores and carnivores <i>Investigation: do all mini-beasts like living in the same microhabitat?</i></p>
YEAR 3	<p>Forces and magnets What are magnets; sorting magnetic and non-magnetic materials; how surfaces effect motion (friction); identify forces on different objects (pushing and pulling) <i>Investigation: how high do we have to put a ramp for a car to roll down different surfaces?</i></p> <p>Light Light and dark; reflective surfaces; mirrors; sun safety; shadows <i>Investigation: how do shadows change when distance between the light source and the object changes?</i></p>	<p>Plants Parts of plants; what do plants needs to grow well; grow a tomato plant to see pollination and fertilisation in action; grow a sunflower to see the life cycle of a flowering plant over the year <i>Investigation: which temperature of water travels up a stem the fastest?</i></p> <p>Animals (including humans) Muscles; functions of a skeleton; naming bones; types of skeleton; amount of nutrition; types of nutrition</p>	<p>Rocks Types of rocks; grouping rocks; fossils and types of fossils; soil formation; palaeontology and Mary Anning <i>Investigation: which soil is the most permeable?</i></p>
YEAR 4	<p>Solids; liquids and gases Identifying everyday solids; liquids and gases and their properties; melting and freezing; using thermometres to measure; water cycle <i>Investigation: what melts the quickest and at what temperature?</i></p> <p>Animals including humans Digestive system; teeth; life cycles <i>Investigation: own tooth decay test using practical enquiry</i></p>	<p>Electricity Research different ways of generating electricity (renewable and non-renewable); sorting appliances which use mains or battery; complete and incomplete circuits using buzzers; bulbs and motors; conductors and insulators; switches <i>Investigation: which material conducts electricity? Which home-made switch is the quickest?</i></p>	<p>Habitats Sorting animals according to habitat; using and making simple dichotomous key to identify animals; hunting for and identifying creatures in local habitat; observing the local habitat change and our effect on the environment; global environments; deforestation; invasive species; pollution; litter; endangered animals</p> <p>Sound Explore how sound travels in solids; liquids; gases; anatomy of the ear <i>Investigation: where is the quietest place in school?</i></p>



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	Cycle 1	Cycle 2	Cycle 3
YEAR 5	<p>Animals including humans Human growth from babies to old age; puberty; gestation periods of different animals; life expectancy of different animals</p> <p>Forces Describing different forces acting on an object; gravity; air resistance; water resistance; friction; forces in mechanisms (leavers; pulleys and gears)</p>	<p>Materials Compare and contrasting materials based on the properties; thermal conductors and insulators; electrical conductors; dissolving; separating mixtures; irreversible changes</p> <p>Space Sun; Earth and moon; the planets; geocentric vs heliocentric theories; night and day</p>	<p>Life cycles Sexual and asexual reproduction; different plan reproduction; fertilization; life cycles of different mammals; amphibians; insects and birds; metamorphosis; the work of the scientist Jane Goodall</p>
YEAR 6	<p>Classification Characteristics of plants and animals including micro-organisms; Linnaean system; classifying micro-organism based on their characteristics</p> <p>Electricity Major discoveries in electricity; volts <i>Investigation: relationship between wire length and brightness of bulbs</i></p>	<p>Evolution and Inheritance Inheritance; adaptation; theory of evolution; fossils; How humans have evolved; how human intervention affects evolution</p> <p>Light Light travels in straight lines; reflecting light; refraction; prisms and the spectrum of light; seeing colours; shadows</p>	<p>Humans including animals The circulatory system parts and functions; transporting water and nutrients; healthy life styles; drugs and alcohol including smoking <i>Investigation: children's own choice based on an exercise theme</i></p>
YEAR 7	<p>Science skills Development of scientific theories; planning an investigation and displaying and analysing results</p> <p>Cells and life processes Plant and animal cells; using a microscope; specialised cells; unicellular organisms; introduction to respiration; photosynthesis and diffusion</p> <p>Forces and space Force diagrams; resultant forces; balanced and unbalanced forces; air resistance investigation; the solar system; day; night and seasons and the history of space exploration</p>	<p>Particles and solutions Solids; liquids and gases; changes of state; dissolving and solubility and separating mixtures</p> <p>Reproduction Puberty; reproductive systems; pregnancy and plant reproduction</p> <p>Energy Energy stores and pathways; law of conservation of energy; efficiency; advantages and disadvantages of renewable and non-renewable energy resources and heat transfer</p> <p>Elements Atoms; the periodic table; chemical formulae; metals and non-metals and chemical reactions</p>	<p>Ecology Competition in ecosystems; adaptations of plants and animals; food chains and webs; pyramids of numbers; bioaccumulation and classification</p> <p>Acids and alkalis pH scale; indicators; neutralisation reactions; indigestion tablet investigation and making salts</p> <p>Sound and light Waves; reflection; refraction; dispersion; colour vision; the eye; amplitude and frequency and the ear</p>
YEAR 8	<p>Body organisation Skeletal system; muscular system; food groups; digestive system; respiratory system circulatory system; the heart and exercise</p> <p>Metals Properties of metals; reactions and reactivity series; extraction of metals from ores and recycling metals</p> <p>Forces and motion Weight; mass and gravity; Hooke's law theory and investigation; speed calculations; distance-time graphs</p>	<p>Health and disease Pathogens; immune system; discovery and use of antibiotics; discovery and use of vaccinations; healthy life choices; smoking; drugs and alcohol</p> <p>Chemical reactions Chemical equations; rates of reaction theory and investigation; conservation of mass and exo/endothemic reactions</p> <p>Electricity and magnetism Circuit diagrams; series and parallel circuits; current and voltage; magnets; magnetic fields and electromagnets</p>	<p>Inheritance and variation DNA and genetics; environmental and inherited variation; natural selection and extinction</p> <p>Plants Photosynthesis; structure of leaves; minerals and starch investigation</p> <p>Environmental chemistry Burning fuels theory and investigation; Earth's atmosphere; global warming; acid rain and water cycle</p> <p>Pressure, density and moments Pressure in solids; liquids and gases; calculating and measuring density and moments calculations</p>
YEAR 9	<p>AQA GCSE Combined Science Trilogy</p> <p>Cell biology Strucutre of eukaryotic and prokaryotic cells; cell division; advantages and disadvantages of stem cells; microscopy and cell transport (diffusion; active transport and osmosis)</p>	<p>AQA GCSE Combined Science Trilogy</p> <p>Organisation Organ systems in plants and animals</p>	<p>AQA GCSE Combined Science Trilogy</p> <p>Infection and response Pathogens; spread and prevention of infection; immune response and treatment of infectious diseases</p>



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YEAR 9	<p>Atomic structure and periodic table Development and current model of the atom; group 1; 7 and 0 elements; properties of metals and non-metals</p> <p>Energy Stores and pathways; law of conservation; efficiency; power; energy resources</p>	<p>Bonding and structure Ionic; covalent and metallic bonding; solids; liquids and gases and properties of substances</p> <p>Particle model of matter States of matter; changes of state; density; internal energy; energy transfers and gas pressure</p>	<p>Chemistry of the atmosphere Composition and evolution of the Earth's atmosphere; greenhouse gases and pollutants</p>
YEAR 10	<p>AQA GCSE Combined Science Trilogy</p> <p>Bioenergetics Respiration and photosynthesis</p> <p>Quantitative chemistry Chemical measurement; conservation of mass; chemical calculations and concentration</p> <p>Chemical changes Reactivity of metals and acids; pH and electrolysis</p> <p>Electricity Circuit components; current; potential difference; resistance; I-V graphs; mains electricity and national grid</p> <p>Atomic structure Model of an atom; radioactive decay and nuclear radiation</p>	<p>AQA GCSE Combined Science Trilogy</p> <p>Homeostasis and response Regulation of internal conditions; nervous and endocrine systems and hormones and fertility</p> <p>Energy changes in reactions Exothermic and endothermic reactions</p> <p>Rate and extent of chemical change Rate of reaction; catalysts; reversible reactions and dynamic equilibrium</p> <p>Force Scalars and vectors; types of forces; resultant forces; work done; Hooke's law; Newton's laws; speed; acceleration; motion graphs; stopping distances and momentum</p>	<p>AQA GCSE Combined Science Trilogy</p> <p>Inheritance; variation and evolution Reproduction; meiosis; genetics; selective breeding; genetic engineering; classification</p> <p>Organic chemistry Crude oil; hydrocarbons; fractional distillation and cracking</p> <p>Chemical analysis Purity; formulations; chromatography and gas tests</p> <p>Waves Transverse and longitudinal waves; properties of waves; uses and applications of electromagnetic waves</p>
YEAR 11	<p>AQA GCSE Combined Science Trilogy</p> <p>Ecology Adaptation; interdependence; competition; biodiversity and human effects</p> <p>Using Resources Potable water; life cycle assessments and recycling</p> <p>Magnetism and electromagnetism Permanent and induced magnetism; magnetic forces and fields; motor effect</p>	<p>AQA GCSE Combined Science Trilogy Review and revision of all GCSE topics</p>	

*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.

