

Science scope and sequence chart: Grades 5 to 9

| | Grade 5 | Grade 6 | Grade 7 | Grade 8 | Grade 9 |
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| SCIENTIFIC ENQUIRY | | | | | |
| Use methods of scientific investigation | <ul style="list-style-type: none"> Planning investigations and systematically collecting a range of evidence Identifying patterns in observations and data, drawing conclusions and testing predictions | <ul style="list-style-type: none"> Planning investigations, collecting data, making observations, drawing conclusions and testing predictions Considering whether evidence supports hypotheses Turning questions into forms that can be investigated | <ul style="list-style-type: none"> Planning investigations, collecting data, making observations, drawing conclusions and testing predictions Using secondary evidence and information Estimating size and quantity Accuracy and techniques to achieve it | <ul style="list-style-type: none"> Planning investigations, collecting data, making observations, ensuring accuracy, drawing conclusions and testing predictions Justifying a conclusion, supporting a prediction or hypothesis, and identifying further investigations that might be needed Making working models to illustrate scientific applications Representative sampling techniques Conducting preliminary investigations Finding and using secondary information sources | <ul style="list-style-type: none"> Planning investigations, collecting data, making observations, ensuring accuracy, calculating, drawing conclusions and testing predictions Evaluating evidence and the validity of conclusions before arriving at a viewpoint Finding and using a variety of secondary information sources Applying scientific knowledge and procedures to real situations Working collaboratively when collecting large quantities of data Estimating margins of error and knowing how these affect results |
| Know how scientists work | | | <ul style="list-style-type: none"> Scientists base conceptual models on patterns in data Scientists in different fields use similar methodology Understanding of science changes over time and results from work in many countries | <ul style="list-style-type: none"> Scientists work in collaboration and with colleagues in other countries Assessing the work of some individual scientists | <ul style="list-style-type: none"> Science can bring great advantages but can also cause irreversible damage to the environment Scientists carry out a variety of different kinds of work Ethical and moral issues raised by science Kinds of question that cannot be answered by science Scientists develop conceptual models to explain the evidence and evaluate conflicting models |

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| Process and communicate information | <ul style="list-style-type: none"> Using simple diagrams and charts Classifying observations according to shared characteristics and making generalised conclusions Performing simple calculations using experimental data | <ul style="list-style-type: none"> Using a range of methods, including ICT, to communicate observations, data, results and conclusions Using and interpreting bar charts and line graphs appropriately Drawing labelled diagrams showing relationships, processes and observations Performing simple calculations using experimental data | <ul style="list-style-type: none"> Using a range of methods, including ICT and calculations, to communicate observations, data, results and conclusions Displaying data and calculations in the form of tables Using a full range of graphical methods to display data Using unit prefixes | <ul style="list-style-type: none"> Using a range of methods, including ICT and calculations, to communicate observations, data, results and conclusions Using graphical methods for discounting experimental error Processing electronically logged data Expressing chemical reactions in the form of word equations | <ul style="list-style-type: none"> Using a range of methods, including ICT and calculations, to communicate observations, data, results and conclusions Using mathematical relationships routinely Performing extrapolations and calculations based on straight-line graphs Processing data in large datasets Using symbol equations to represent chemical reactions and physical relationships |
| Handle equipment and make measurements | <ul style="list-style-type: none"> Selecting and using simple specialised equipment Adapting everyday items to help carry out scientific investigations Making accurate measurements of time, distance and force | <ul style="list-style-type: none"> Making models to explain scientific phenomena Measuring mass and volume of solids and liquids Selecting and using specialised equipment Using a simple microscope | <ul style="list-style-type: none"> Following complex written instructions Reading analogue meters with unitary and more complex divisions Using a trundle wheel, tape measure, ruler, callipers and micrometer Using laboratory heat sources Preparing a microscope slide Selecting and using electrical components appropriately Correct malfunctioning circuits | <ul style="list-style-type: none"> Using datalogging equipment Selecting and using optical equipment | <ul style="list-style-type: none"> Using a datalogger to collect large quantities of data Connecting and reading voltmeters and ammeters correctly Using an oxygen meter, respirometer, barometer and manometer Growing and handling micro-organisms |

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| LIFE SCIENCE | | | | | |
| Diversity and variation in living things | <ul style="list-style-type: none"> • Characteristics of different groups of animals • Variation of individuals of the same type of organism | <ul style="list-style-type: none"> • Classification of organisms into major taxonomic groups | <ul style="list-style-type: none"> • Environmental and inherited variation • Selective breeding | | <ul style="list-style-type: none"> • Sexual reproduction as a source of genetic variation • Asexual reproduction produces clones • Mutation as a source of genetic variation • Adaptations of organisms to their habitats • Evolution by natural selection • DNA, genes, and dominant and recessive alleles • Monohybrid inheritance • Genetic engineering |
| Living things and their environment | <ul style="list-style-type: none"> • Feeding relationships between organisms in a habitat | | <ul style="list-style-type: none"> • Simple food chains • Food webs are composed of food chains • Sensitivity of food chains to human actions • Changes in environment destabilise food webs | <ul style="list-style-type: none"> • Pyramid of numbers and biomass • Feeding relationships • Accumulation of toxins along a food chain | |
| Life processes | <ul style="list-style-type: none"> • Basic life processes common to all living things • The life processes of living things are related to the environment in which they live • Sexual reproduction requires mating | <ul style="list-style-type: none"> • Cells as the basic building blocks of organisms • Cells can have special functions • Cells form tissues which form organs • Organs and their functions • External and internal fertilisation | <ul style="list-style-type: none"> • Animal and plant cells and functions of main structures • Structure and function of specialised cells | <ul style="list-style-type: none"> • Structure and function of plant cells involved in photosynthesis | <ul style="list-style-type: none"> • How substances enter and leave cells by diffusion and osmosis • Factors affecting osmosis and diffusion • Mitosis and meiosis |

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| Humans as organisms | <ul style="list-style-type: none"> Carbohydrates, proteins and fats as foods Role of vitamins and fibre in the diet Food as a source of energy Main stages in human life cycle | <ul style="list-style-type: none"> Digestive system Blood as transport system Structure and function of teeth Puberty | <ul style="list-style-type: none"> Human reproductive system Foetus development and birth | <ul style="list-style-type: none"> Role of lungs in breathing Blood as carrier of gases Structure and function of the heart Blood vessels and the blood circulation system Digestive enzymes Absorption Chemistry of digestion; function of organs and role of enzymes, stomach acid and bile Factors affecting enzyme action | <ul style="list-style-type: none"> Biochemistry of aerobic respiration as a cellular reaction between oxygen and glucose to produce water and carbon and release energy Factors affecting respiration Role of skeleton, joints and muscles in movement The nervous system Structure and function of ear and eye Homeostasis and the role of hormones in control Sex inheritance |
| Health and hygiene | <ul style="list-style-type: none"> Importance of a balanced diet | <ul style="list-style-type: none"> Hygiene to protect against illness caused by micro-organisms Prevention of food spoilage by micro-organisms Dental care | <ul style="list-style-type: none"> Importance of good nutrition during pregnancy Importance of good nutrition and hygiene to the health of babies | <ul style="list-style-type: none"> Smoking and health Obesity Common metabolic disorders including diabetes | <ul style="list-style-type: none"> The body's defence systems to maintain health Use of vaccination in disease prevention Use of antibiotics in health care Inherited disorders |
| Green plants as organisms | | | <ul style="list-style-type: none"> Nitrogen and other nutrients required for plant growth Root hairs and water and mineral absorption Transport of water | <ul style="list-style-type: none"> Photosynthesis as the process by which plants make their food Factors affecting photosynthesis | <ul style="list-style-type: none"> Plant cells carry out aerobic respiration Biochemistry of photosynthesis as a light-dependent biochemical reaction between water and carbon dioxide that takes place in chloroplasts and produces oxygen and glucose |
| Micro-organisms | | | <ul style="list-style-type: none"> Nitrogen-fixing bacteria Micro-organisms as decomposers and recyclers | <ul style="list-style-type: none"> Use of micro-organisms in food production | <ul style="list-style-type: none"> Common diseases caused by micro-organisms Process and products of anaerobic respiration (fermentation) by micro-organisms |

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| MATERIALS | | | | | |
| Changing materials | <ul style="list-style-type: none"> Importance of water for living things Conservation of water Water cycle, rain, evaporation and condensation Obtaining drinking water from sea water Dissolving Ways of changing common materials temporarily and permanently | <ul style="list-style-type: none"> Factors affecting solubility and rate of dissolving Recovery of solute by evaporation Filtration to separate insoluble materials Everyday examples of filtration Heating and burning Physical and chemical changes | <ul style="list-style-type: none"> Composition of air Properties of oxygen and nitrogen Burning as combining with oxygen to form oxides Elements, mixtures and compounds; symbols; reactions of elements to form compounds Separation of mixtures and techniques of purification | <ul style="list-style-type: none"> Characteristics, extraction and uses of some common metals Tarnishing, corrosion, rusting and prevention Hydrogen | <ul style="list-style-type: none"> Importance of carbon in living materials Polymers: natural, synthetic, uses, bonding and structure Oil and natural gas as a chemical feedstock Relating changes in molecular structure to changes in physical properties of materials Pollution of air and water Carbon dioxide: fuel burning, greenhouse effect, global warming |
| Matter and energy | | | <ul style="list-style-type: none"> Characteristic movement of particles in a solid, liquid and gas Phase changes in terms of particle model Explanation of common phenomena in terms of particle theory Evidence for the existence and size of particles | <ul style="list-style-type: none"> Atoms and molecules; elements and compounds; symbols and formulae Conservation of mass during a reaction | <ul style="list-style-type: none"> Atomic structure and bonding Isotopes Endothermic and exothermic reactions; reaction energy profiles Comparison of different fuels Renewable and non-renewable energy sources Origin of fossil fuels |
| Patterns in reactivity | | | <ul style="list-style-type: none"> Acids, alkalis and indicators Properties of acids; neutralisation pH scale Word equations | <ul style="list-style-type: none"> Metals and non-metals Periodic classification of elements Reactivity series for metals Salts of metals | |

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| EARTH AND SPACE | | | | | |
| Earth sciences | <ul style="list-style-type: none"> • Classification of rocks according to observable characteristics • Uses of rocks • Weathering of rocks over time • Soil from rocks • Comparison of different soils | | <ul style="list-style-type: none"> • Structure and properties of different rock types • Igneous, sedimentary and metamorphic rocks • Minerals • Geological time scale • Internal structure of the Earth | | |
| Space | | <ul style="list-style-type: none"> • Sun–Earth–Moon system • Orbits of the Earth and Moon; causes of the seasons and phases of the Moon • Eclipses of the Sun and Moon • Tides | | <ul style="list-style-type: none"> • The Solar System • The planets: their positions and conditions compared with conditions on Earth • Moon and planets as illuminated objects; stars and Sun as light sources • Artificial satellites and their uses | <ul style="list-style-type: none"> • Stars and galaxies • The light-year • Stellar life cycles and element formation • Supernovae, white dwarfs, neutron stars (pulsars) and black holes • Big bang model and the expanding Universe |
| PHYSICAL PROCESSES | | | | | |
| Forces and movement | <ul style="list-style-type: none"> • Measuring forces • Friction and its applications • Dynamic and static friction • Air and water resistance and the effect of shape of objects on movement in air and water • Measuring speed | <ul style="list-style-type: none"> • Distinction between contact forces and forces acting at a distance • Electrostatic and magnetic forces • Gravity, mass and weight • Balanced and unbalanced forces and their diagrammatic representation • Unbalanced forces causing changes in velocity and shape • Terminal velocity | <ul style="list-style-type: none"> • Gravity, weightlessness and weight on other planets • Resolution of multiple forces on an object; action and reaction • Upthrust and floating • Centre of gravity and stability | | <ul style="list-style-type: none"> • Pressure • Fluid pressure • Moments and levers; simple machines • Pneumatics and hydraulics • Structures: compressive and tensile strength |

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| Matter and energy | | | <ul style="list-style-type: none"> Measuring mass, length, volume, area, density Large and small units | <ul style="list-style-type: none"> Energy transformations and conservation Kinetic and potential energy Useful energy changes Heat and temperature Conduction, convection and radiation of heat Good and bad heat conductors Reducing heat energy waste | |
| Waves, light and sound | | <ul style="list-style-type: none"> Basic properties of light Formation of shadows Light sources and light reflectors Seeing objects by reflected light Coloured light from white light | | <ul style="list-style-type: none"> Properties of light and light intensity Reflection by plane mirrors: examples and applications Refraction at plane surfaces: examples and applications Dispersion and colour: examples and applications Combining coloured light | <ul style="list-style-type: none"> Waves and energy transmission Reflection and refraction of waves The electromagnetic spectrum Sound velocity, frequency, wavelength, loudness, pitch and amplitude |
| Electricity and magnetism | <ul style="list-style-type: none"> Production and properties of electrostatic charge Production and properties of magnets Circuits, batteries, bulbs and switches in common electrical devices; polarity of batteries Conductors and insulators | | <ul style="list-style-type: none"> Electrostatic charge; its detection and classification Lightning and lightning conductors Magnetic poles, field patterns and strength, field due to the Earth Making and testing a magnet Electrical circuits and common components Electric current Connecting cells in a circuit Series and parallel circuits Earthing, fuses and circuit breakers | <ul style="list-style-type: none"> Electromagnets and devices that use electromagnets Movement of a conductor in a magnetic field Electric motors | <ul style="list-style-type: none"> Potential difference, resistance and Ohm's law Electrical energy Electricity generation AC and DC Household electricity |

