# Curriculum Overview

## The Link Academy 2023 Onwards Combined Science/Triple Science

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| Name of Department | Science |
| Head of Department | Dawn Sutton |

| Big Idea | Year 7 | Year 8 | Year 9 | Year 10 | Year 11 | Career Links |
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| **Key diagnostic question** | **How do cells make organisms?** | | | | | |
| **Cells and Systems** | Structure.<br>Cell structure and specialised cells.<br>Microscopes<br>Diffusion.<br>Unicellular organisms.<br>Levels of organisation.<br>Gas exchange.<br>Skeleton, movement muscles.<br>Tissues and organs.<br>Digestive system.<br>Respiration | Cellular processes.<br>Photosynthesis, leaf structure.<br>Circulatory system<br>Respiration | Microscopy. Resolving and magnification<br>Eukaryotes and prokaryotes<br>Animal and plant cells (algae)<br>Cell specialisation<br>Cell transport<br>Diffusion, osmosis, active transport, surface area.<br>Culturing Microbes * | Respiration and Photosynthesis<br>Uses, metabolism, liver and lactic acid, limiting factors, energy transfers, monitoring rate and limiting factors.<br>Organisation in plants and animals<br>Blood, blood vessels, heart, xylem, phloem, transpiration. | Homeostasis, structure and function of the nervous system.<br>Hormonal coordination<br>Hormones, blood glucose control, diabetes, contraception, menstrual cycle, use of hormones to treat infertility, negative feedback.<br>Homeostasis in action.<br>The brain * the eye* control of body temperature * maintaining water and nitrogen balance * Plant hormones * DNA Structure * Cloning* Speciation * | https://www.myworldofwork.co.uk/sites/default/files/Biology-BGE-body-systems-and-cells.pdf |
| **Literacy** | Tier 2 words- describe, explain, compare, contrast, define, identify, justify, predict, show.<br>Tier 3 words- mitochondria, ribosomes, tissue, organ, photosynthesis, diffusion, osmosis, active transport, limiting, homeostasis, hormones, aerobic, anaerobic, chloroplast, cytoplasm, palisade, tropism, lactic acid, phloem, xylem, transpiration | | | | | |
| **Numeracy** | Choosing appropriate ranges, numbers, and values for measurements and observations.<br>Interpret data of inhaled and exhaled air. | Measure heart rate and breathing rate | Calculating surface area, use formula to calculate magnification, orders of magnitude, calculating cross-sectional areas | Rate of enzyme action, plotting straight line graphs, drawing tangents | Calculating reaction times. Calculating percentage changes, | |

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| **Key Diagnostic Question** | **How does your body keep you healthy?** | | | | | |
| **Microbes and Health** | Health and lifestyle Nutrients Digestion, food and tests, bacteria, enzymes, | Microbes and Pathogens, body defences, asthma, heart disease, balanced and unbalanced diet, drugs, alcohol, smoking. | Digestive system Structures, lipids, proteins carbohydrates, food tests, enzymes, factors affecting enzymes, liver, gall bladder. | Communicable diseases Disease, Bacterial, fungal, protist and viral diseases, human defence, Preventing and treating disease and non-communicable diseases Vaccination, antibiotics, painkillers, drugs. Monoclonal antibodies * Plant disease* | | https://microbiologysociety.org/careers.html |
| **Literacy** | Tier 2 words- describe, explain, compare, contrast, define, identify, justify, predict, show.<br>Tier 3 words- carbohydrates, protein, enzyme, virus, bacteria, protist, antibiotic, antitoxin, painkiller, lipid, lipase, amylase, protease, fungal, white blood cell, platelets, mucus, cilia, phagocytosis | | | | | |
| **Numeracy** | Interpret data of drug use. Drawing graphs. | Analysis of antibiotic usage data, analysis of data on disease. | Calculating rates of reaction. | Use of scatter diagrams to identify trends and interpret data. | | |

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| **Key diagnostic Question** | **Why do giraffes have long necks?** | | | | | |
| **Genetics and Evolution** | Reproduction in plants and animals<br>Adolescence, reproductive systems, fertilisation, seed dispersal.<br>Human variation. | Adaptation and inheritance<br>Variation, inheritance, natural selection, extinction, classification. | Cell division<br>Chromosomes, Mitosis and the cell cycle, Stem cells, Cell differentiation, Cancer | | Sexual and asexual reproduction, meiosis, DNA, inheritance, genetic crosses, genetic diseases.<br>Variation, natural selection, selective breeding, genetic engineering, ethics.<br>theory of evolution, evidence for evolution, fossils, extinction, resistant bacteria. | https://www.myworldofwork.co.uk/sites/default/files/Biology-BGE-inheritance.pdf<br><br>https://www.myworldofwork.co.uk/sites/default/files/Biology-antenatal-and-postnatal-screening.pdf |
| **Literacy** | Tier 2 words- describe, explain, compare, contrast, define, identify, justify, predict, show.<br>Tier 3 words- stamen, sepal, ovary, oviduct, fertilisation, gametes, genes, chromosomes, phenotype, genotype, heterozygous, homozygous, dominant, recessive, mitosis, differentiation, speciation, classification, resistance, implantation, continuous, discontinuous | | | | | |
| **Numeracy** | Using data to calculate percentages, calculate mean | Tally charts, histograms of inherited data | Analysis of data for cancer related diseases. | | Calculate probability from genetic crosses | |

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| **Key Diagnostic Question** | **What cycles in an ecosystem?** | | | | | |
| **Interdependence** | | Plant minerals, Ecosystem processes Food chains and webs, decay, Ecosystems Adaptation Competition, sampling techniques | | Interdependence Abiotic/biotic factors, communities, sampling, adaptations, competition. Organising an ecosystem Nutrient cycles, decomposition Biodiversity and Ecosystems global warming, pollution, deforestation, land use, waste management, biodiversity. Trophic levels * Food production * | | |
| **Literacy** | Tier 2 words- describe, explain, compare, contrast, define, identify, justify, predict, show.<br>Tier 3 words- producer, consumer, predator, prey, herbivore, carnivore, omnivore, adaptation, quadrat, random, abiotic, biotic, nutrient, cycle, biodiversity, methane, deforestation, pollution, biomass, trophic, decomposition, surface area to volume ratio | | | | | |
| **Numeracy** | | Calculating mean, median, mode, estimating population sizes, tally charts | | Analysing data over time for global warming, calculating estimate populations, means, use of predator prey graph analysis | | |

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| **Key Diagnostic Question** | **How are particles arranged in materials?** | | | | | |
| **Particles and Bonding** | Particles and their behaviour.<br>Particles model, states of matter, changes of state, density, diffusion, pressure<br>Separation Techniques<br>Mixtures, solutions, solubility, filtration, evaporation, distillation, chromatography | Ceramics, polymers, and composites | Atomic structure and separating techniques<br>Atoms, separating mixtures, chromatography, nuclear structure, isotopes, ions<br>Ionic and covalent bonding<br>States of matter, ionic bonding, simple molecules. Bonding and properties<br>Giant covalent, fullerenes, graphene, metallic bonding, nanoparticles* | Crude oil and fuels<br>Products from crude oil, cracking and alkenes, alkenes *, alcohols *<br>Carboxylic acid *<br>Polymers * amino acids and DNA * | Chemical analysis: gases<br>Pure substances and mixture, chromatography, tests for gases, Spectroscopy *<br>Identification of ions *<br>Corrosion * alloys * polymers * | https://www.myworldofwork.co.uk/sites/default/files/Chemistry-crude-oil.pdf<br><br>https://www.myworldofwork.co.uk/sites/default/files/Chemistry-chemical-analysis.pdf |
| **Literacy** | Tier 2 words- describe, explain, compare, contrast, define, identify, justify, predict, show.<br>Tier 3 words- particles, boiling, condensing, evaporation, sublimation, chromatography, filtration, crystallisation, diffusion, solubility, polymers, ceramics, composite, proton, neutron, electron, nucleus, ionic, covalent, isotope, ion, crude oil, alkane, alkene, distillation, polymerisation, mixture, thermosetting, thermosoftening | | | | | |
| **Numeracy** | Calculating density, measuring Rf values in chromatography | | Identifying number of electrons to transfer in ionic bonding. | Analysing fractional distillation data, calculating numbers of hydrogen and carbon in alkanes, calculating Rf values | | |

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| **Key Diagnostic Question** | **Why do scientists write chemical equations?** | | | | | |
| **Amounts and Equations** | Elements, atoms and compounds elements, compounds, atoms, molecules, formulae Word equations Conservation of mass | Symbol formula, formula mass | Symbol formula, atomic mass and formula mass, Yield and atpm economy *, Concentration of gases and solutions * | Equations and formulae. Balanced equations, Relative formula mass. Mole calculations Using moles Reacting masses Concentration | | |
| **Literacy** | Tier 2 words- describe, explain, compare, contrast, define, identify, justify, predict, show, calculate<br>Tier 3 words- atom, element, compound, conservation, mass, mole, concentration, titration, volume | | | | | |
| **Numeracy** | Balancing equations, present information in tables and graphs. Interpret observations and data, calculate percentage of an element in a compound | Balancing equations, present information in tables and graphs. Interpret observations and data, calculate percentage of an element in a compound | | Calculating RfM, moles, reacting masses, | | |

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| **Key Diagnostic Question** | **How can I make more product faster?** | | | | | |
| **Physical Chemistry** | Combustion, Physical Change | Combustion. Endo/exothermic reactions | | Rates of reaction Calculating rates, Factors that affect rates, Collision theory, Catalysts Extent of chemical change Equilibrium Energy changes Endo/exothermic reactions Reaction profiles, Fuel Cells * | Using resources, potable water, Alternative methods of metal extraction. Equilibrium, effects of changing conditions. Haber process * | |
| **Literacy** | Tier 2 words- describe, explain, compare, contrast, define, identify, justify, predict, show, calculate<br>Tier 3 words- endothermic, exothermic, collision, catalyst, equilibrium, temperature, concentration, surface area, potable, extraction, corrosion, alloy, fertiliser | | | | | |
| **Numeracy** | Measuring temperature change | Measuring rates, using balances, gas syringes, interpreting graphical data | | Measuring rates, using balances, calculating rate of reaction, drawing tangents to calculate rate of reaction, interpreting graphical data of rates of reaction. Calculating energy changes using bond energies, drawing energy profile diagrams, measuring temperature change, balancing half equations | Extract and interpret information from charts and graphs, make estimates, use ratios, fractions and percentages, translate information between graphical and numerical form | |

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|---|---|---|---|---|---|---|
| **Key Diagnostic Question** | **What are the different types of reactions?** | | | | | |
| **Types of Reactions** | Reactions<br>Chemical reactions, burning fuels, decomposition,<br>Acids and Alkalis<br>Acids and alkalis, pH and indicators, neutralisations, making salts. Endothermic and exothermic reactions | Periodic Table<br>Metals and non-metals, Groups and periods, Grp1, Grp7, Grp 0<br>Metals and acids<br>Reactions of acids, reactions of metals, displacement reactions<br>The Earth<br>Atmosphere, rocks, rock cycle, C-cycle, recycling, climate change, thermal decomposition. | The Periodic table<br>History of the periodic table, electronic structure, Reactions of Groups 1,7 and 8, explaining trends<br>Transition metals *<br>Titration * | Reactivity series<br>Chemical changes: oxidation OIL RIG<br>Electrolysis of molten compounds<br>Extraction of Al, Half-equations,<br>Chemical changes: acids.<br>Neutralisation & making soluble salts.<br>pH Scale and acid strength. Titration * | Effects of human activities<br>Earth's resources<br>Wastewater, life cycle assessments<br>Chemistry of our atmosphere. | https://www.myworldofwork.co.uk/sites/default/files/Chemistry-BGE-reactions-of-metals.pdf |
| **Literacy** | Tier 2 words- describe, explain, compare, contrast, define, identify, justify, predict, show, calculate<br>Tier 3 words- acid, alkali, neutralisation, indicator, combustion, decomposition, displacement, igneous, sedimentary, metamorphic, climate, greenhouse, methane, reduction, oxidation, redox, concentration, strength, base, insoluble, soluble | | | | | |
| **Numeracy** | Balancing equations, use of measuring equipment | Use of graphical data, plot data into appropriate graphical form | Use orders of magnitude, balancing equations, | balancing ionic equations, using data to explain trends | Use orders of magnitude, extract and interpret information from graphs and charts, use ratios, fractions and percentages | |

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|---|---|---|---|---|---|---|
| **Key Diagnostic Question** | **How is energy transferred?** | | | | | |
| **Energy** | Energy<br>Food and fuels, energy transfer, stores, cost of energy, energy resources, efficiency<br>Temperature, conduction, convection, radiation, energy and power, machines<br>. | | Energy transfer by heating<br>Conduction, infrared*, specific heat capacity and insulation.<br>Energy stores/transfers, energy conservation gpe., Ek, Ee, Ep, dissipation, work, power and efficiency. Energy resources. wind/water, sun, geothermal, nuclear, fossil, environment and issues. | Density, change of state, states, internal, latent heat, gas pressure,<br>Atomic structure and radiation.<br>Atomic structure, discovery of nucleus, alpha, beta and gamma, half-life, radiation in medicine, Fission and Fusion * | | https://www.myworldofwork.co.uk/sites/default/files/Physics-radiation.pdf |
| **Literacy** | Tier 2 words- describe, explain, compare, contrast, define, identify, justify, predict, show, calculate<br>Tier 3 words- energy, transfer, conservation, thermal, light, chemical, gravitational, hydroelectric, solar, tidal, conduction, convection, radiation, power, machine, infrared, insulator, conductor, density, dissipation, efficiency, alpha, beta, gamma, Becquerel, fission, fusion, half-life | | | | | |
| **Numeracy** | Plotting graphs using data, calculating energy transfers, calculating cost of energy using equations | Using equations to calculate energy and power | Recall and calculate using a variety of equations, rearranging equations, calculating percentages, analysis of renewable and non renewable data, change the subject of an equation | Plotting half life graphs, using half-life graphs to calculate half-life, use of standard form, balancing nuclear equations, calculating density. | | |

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| **Key Diagnostic Question** | **How are magnets and electricity similar?** | | | | | |
| **Electricity and Magnetism** | | Electricity and magnetism<br>Static, circuits, current, p.d., series and parallel, resistance, magnets, fields, electromagnets, motors | | Static Electricity *<br>Electricity: current and potential difference<br>Static, drawing fields, current, charge, potential difference and resistance, component characteristics, series and parallel Electricity in the home<br>d.c. and a.c. cables and plugs, power and p.d, energy transfer, efficiency | Magnetism and Electromagnetism<br>Magnets and electromagnetic fields, electric motors,<br>Motor effect.<br>Transformers* microphones*Generator effect* | https://www.myworldofwork.co.uk/sites/default/files/Physics-electricity.pdf |
| **Literacy** | Tier 2 words- describe, explain, compare, contrast, define, identify, justify, predict, show, calculate<br>Tier 3 words- static, charge, electron, series, parallel, magnet, electromagnet, solenoid, core, induced, component, resistor, thermistor, filament lamp, diode, earth, neutral, live, fuse, motor, permanent, temporary, transformer, generator | | | | | |
| **Numeracy** | | Calculating current, resistance and potential difference using equations, interpreting data on magnets and electromagnets | Recall and calculate using a variety of equations, rearranging equations, calculating percentages, use of standard form, converting units, change the subject of an equation | | | |

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|---|---|---|---|---|---|---|
| **Key Diagnostic Question** | **What is a force?** | | | | | |
| **Forces** | Forces<br>Deformation, effects, drag, contact and non-contact, friction, balanced and unbalanced, resultant forces, Hooke's Law, moments.<br>Space<br>Moons, seasons, Solar System, night and day, Universe, scale | Motion and pressure<br>Speed, speed/distance graphs,<br>pressure in (s),(l) and (g)<br>moments, | Particle motion in gases<br>Gas pressure* | Forces in balance<br>Vectors and scalars, resultant forces, centre of mass, stability, parallelogram and resolution of forces<br>Forces and motion<br>Acceleration, weight and terminal velocity, braking, momentum, and elasticity<br>Motion<br>Distance time graphs including area under curve, speed and velocity, acceleration.<br>Changes in momentum<br>* | Solar system * life cycle of a star * Res shift* | https://www.myworldofwork.co.uk/sites/default/files/Physics-forces.pdf<br><br>https://www.myworldofwork.co.uk/sites/default/files/Physics-astronomy.pdf |
| **Literacy** | Tier 2 words- describe, explain, compare, contrast, define, identify, justify, predict, show, calculate<br>Tier 3 words- deformation, contact, non-contact, resistance, drag, gravity, weight, balanced, resultant, speed, distance, moment, equilibrium, universe, solar system, planet, vector, scalar, lever, acceleration, terminal velocity, velocity, momentum, elasticity, pressure, limescale, star, red-shift, big-bang, | | | | | |
| **Numeracy** | Calculating extension, balancing forces | Use of equation to calculate speed, changing the subject of an equation, plotting speed/distance graphs, analysing graphs | | Calculating resultant forces, protractors to measure angles, use of scales, converting scales, interpreting speed and velocity graphs, drawing tangents to calculate velocity | | |

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|---|---|---|---|---|---|---|
| **Key Diagnostic Question** | **How are waves similar and different?** | | | | | |
| **Waves** | Sound<br>Longitudinal, wave properties, echo, ultrasound, ear<br>Light<br>Luminous and non-luminous, reflection, refraction, eye, camera, colour, filters | Energy transfer by radiation | | | Properties of waves<br>Transverse and longitudinal waves, properties, calculating period and wave speed, reflection and refraction,<br>Electromagnetic waves<br>Spectrum, uses and applications. Light *<br>Sound waves * | http://www.physics.org/careerprofile.asp?ProfileId=24 |
| **Literacy** | Tier 2 words- describe, explain, compare, contrast, define, identify, justify, predict, show, calculate<br>Tier 3 words- wave, longitudinal, transverse, ultrasound, echo, luminous, non-luminous, reflection, refraction, filters, infrared radiation, black body, wave speed, wavelength, seismic, spectrum, diverging, converging, concave, convex, principal axis, principal focus, transmission, translucent, transparent, opaque | | | | | |
| **Numeracy** | Measuring sound, using speed, distance and time. | Record temperature, plotting line graphs, analysing data of different materials | | | Calculating frequency, wavelength, velocity, time period, speed, distance and time. Measuring angles of reflection and refraction, calculating magnification, using scales | |

**Other career links**

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| Biology | General | https://www.rsb.org.uk/careers-and-cpd/careers/career-resources |
| Chemistry | General | http://www.rsc.org/careers/future/teachers-and-careers-advisers |
| Chemistry | Careers videos chemicals and Pharma | Careers videos Chemicals and pharma https://icould.com/stories/job-types/chemicals-and-pharmaceuticals/ |
| Chemistry | Careers in chemistry | https://www.myworldofwork.co.uk/sites/default/files/Chemistry-BGE_0.pdf |
| STEM careers | comprehensive resource on stem careers | STEM Careers Tooolkit: http://www.cegnet.co.uk/uploads/resources/STEM_Careers_Toolkits.pdf |
| STEM careers | classroom speakers | STEM Ambassadors - find speakers to come into your classroom https://www.stem.org.uk/stem-ambassadors |
| STEM careers | engineering careers | Engineering http://www.tomorrowsengineers.org.uk/ |
| STEM careers | green careers | Green careers http://www.cegnet.co.uk/uploads/resources/Cegnet_briefing_-_Teaching_about_Green_Careers.pdf |
| STEM Careers | women in science and engineering | WISE Women in Science and Engineering https://www.wisecampaign.org.uk/ |
| STEM careers | Year of engineering | Year of Engineering lesson plans https://www.yearofengineering.gov.uk/lesson-ideas |
| STEM careers | careers in science and engineering | Careers in science and engineering https://www.wfsf.org/resources/leala-pedagogical-resources/texts-accompanying-video-resources/5-lessonplan-1igniteyour-future/file |
| STEM careers | careers in medicine | Medicine https://www.medicalmavericks.co.uk/for-teachers |
| STEM careers | careers in medicine | Medicine http://broughttolife.sciencemuseum.org.uk/broughttolife/teachers/curriculumlinks |
| STEM careers | careers in automotive industry | Motor Vehicle http://www.autocity.org.uk/index.php/schools-teachers-career-advisors/ |

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| STEM careers | health care carers videos | Healthcare careers videos https://www.youtube.com/channel/UCxGgYSuq0XR0siPOJVq8trQ |
| STEM careers | science and engineering careers | https://www.pearson.com/content/dam/one-dot-com/one-dot-com/uk/documents/educator/secondary/resources/careers-resources/year9/lesson4/Y9_Lesson_plan_4_Promoting_science_technology_engineering_and_mathematics.doc<br><br>https://www.pearson.com/content/dam/one-dot-com/one-dot-com/uk/documents/educator/secondary/resources/careers-resources/year9/lesson4/Y9_L4_Activity_4.1_Job_overview.doc<br>https://www.pearson.com/content/dam/one-dot-com/one-dot-com/uk/documents/educator/secondary/resources/careers-resources/year9/lesson4/Y9_PowerPoint_4.1_Introduction_to_Lesson_4.ppt |
| STEM Careers | NHS KS3 | https://www.stepintothenhs.nhs.uk/ |
| STEM Careers | NHS careers | https://www.healthcareers.nhs.uk/ |
| STEM Careers | Transport | Transport Careers http://www.plotr.co.uk/careers/worlds/a-better-connected-future-transport-careers |