L.E.A.D. Academy Trust

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Secondary Curriculum

Science

Curriculum intent map

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Science

The Birley Academy
A L.E.A.D. Academy

Theme/Concept	(KS2)	Year 7	Year 8	Year 9	Year 10	Year 11	(Post-16)
Biology: The cellular basis of life		**What is life?** Animal & plant cell structure Microscopy Specialised animal & plant cells Introduction to stem cells Organisation & unicellular organisms Diffusion Osmosis	**Respiration** Aerobic and anaerobic respiration Word equations Breathing rate and heart rate	**Cells & Cell Transport** Prokaryotic & eukaryotic cells Specialised cells Microscopes & magnification Osmosis Diffusion Active Transport	**Cell division** (cells recap) Chromosomes The cell cycle Mitosis Stem cells	*(Application)*	*Biological molecules* *Cells* *Organisms exchange substances with their environment*
			(photosynthesis taught in plant biology)		**Bioenergetics** Photosynthesis & limiting factors Using glucose from photosynthesis Aerobic and anaerobic Respiration metabolism		
Biology: DNA as the molecule of inheritance	*Animals including humans* *Evolution & Inheritance*	*(Cells)*	**Reproduction** Human reproductive systems Sexual and asexual reproduction Fertilisation Pregnancy and birth The menstrual cycle Contraception	*(cells and cell transport)*	**Inheritance** Sexual & asexual reproduction meiosis Genetic inheritance Genotype & phenotype Inherited disorders Sex determination Variation Understanding of genetics DNA and the genome TRIPLE CONTENT *Advantages & disadvantages of sexual & asexual reproduction* *DNA structure* *Protein synthesis*	**Variation & evolution** Selective breeding Evolution & natural selection Evidence for evolution Antibiotic resistance Genetic engineering Cloning Fossils Classification TRIPLE CONTENT *Cloning* *Theory of evolution* *Speciation* *The understanding of genetics*	*Genetic information, variation* *Genetics* *The control of gene expression*
Biology: Human Biology		**Health & fitness** Biomechanics - skeleton, muscles & exercise Basic digestion & nutrition Nervous system Simple endocrine systems Substance misuse	**Breathing & Circulation** The Lungs Diffusion Asthma & smoking Lung disease The heart - basics Exercise Smoking	**The digestive system** Human digestive system Food tests Digestive enzymes **The heart & circulation** Blood The heart Blood & blood vessels Health issues Non-communicable diseases Heart disease The lungs	**Defence and immunity** Pathogens & microbes Communicable diseases Human defense systems Discovery and development of drugs Reducing the spread of infection Vaccination Antibiotics & painkillers Culturing microorganisms TRIPLE CONTENT *Monoclonal antibodies & their uses.* *Plant diseases & plant defence response.*	**Homeostasis & response** Human nervous system Human endocrine system Control of blood glucose TRIPLE CONTENT Maintaining water & nitrogen *balance* *The Brain* *The Eye* *Control of body temperature* *Plant hormones & uses of plant hormones*	*Organisms exchange substances with their environment* *Energy transfers* *Organism response to environment*
Biology: Ecosystems	*Living things and their habitats*	**Ecology** Habitats & communities Variation Continuous & discontinuous variation Biodiversity Biotic and abiotic factors Adaptation & variation Charles Darwin Natural selection Sampling	**Plant Biology** Plant structure Leaf structure & adaptations (basic) Photosynthesis word equation Structure of the flower Reproduction in plants seed dispersal	**Plant organisation** Leaf structure Stomata Transport in plants (transpiration and translocation)	**Adaptations & competition** Interdependence biotic & abiotic factors Sampling Adaptations & competition Extremophiles Feeding relationships TRIPLE CONTENT Trophic levels Interdependence Pyramids of biomass Transfer of biomass Pollution Nutrient cycles Food security Food production Decoposition The impact of environmental change	**Human effects on ecosystems** Biodiversity Deforestation & peat bogs The carbon cycle The water cycle Global warming	*Relationships between organisms* *Energy transfers* *Populations, evolution and ecosystems*

Chemistry: Structure, Properties, Bonding & Analysis		*(Substances & Properties)*	**Elements, mixtures and compounds** Particulate nature of matter Elements, compounds Symbols & formulae Mixtures Introduction to the Periodic Table	**Atomic structure** Atomic structure Subatomic particles Charge Size & mass Relative atomic mass Isotopes Electronic structure Balancing equations	**Bonding** Chemical bonds Ionic bonding Properties of ionic compounds Covalent bonding Properties of small molecules Giant covalent structures Structure and bonding of carbon Comparison to ionic bonding Metallic bonding Properties of metals and alloys including conductors Polymers.	**Crude Oil Hydrocarbons / organic chemistry** Hydrocarbon molecules Cracking Fractional distillation TRIPLE CONTENT Reactions of organic compounds (triple only) Synthetic & naturally occurring polymers (triple only)	*Atomic structure, amount of substance, bonding*
	Rocks	*(Substances & Properties)*	**Chemical analysis** Pure & impure substances Solutions & salts Chromatography Filtering & evaporation Simple distillation	**Periodic Table** Elements Metals & non-metals Atomic structure & periodic patterns History of the Periodic Table Group 0 Group 1 Group 7 TRIPLE CONTENT Properties of transition metals	**Electrolysis** Electrolysis of molten compounds & solutions Balanced equations Extracting aluminium		*Energetics, kinetics, thermodynamics, rate equations, acids & bases, periodicity*
					Chemical Analysis Purity Formulations Chromatography Identification of common gases TRIPLE CONTENT Identification of ions by chemical and spectroscopic means (triple only)		
Chemistry: Chemical Reactions	*Properties and changes of materials*	**Substances & properties** Composites, ceramics and polymers Acids & alkalis Concentration & dilution pH scales Neutralisation Simple titrations Reactions of acids including: making a salt Testing for hydrogen and carbon dioxide Representing reactions using word equations	**Chemical Reactions** Reactants & products Conservation of mass Representing reactions using: Word equations Symbol equations (simple balanced) Combustion, thermal decomposition, oxidation, reduction and displacement Endothermic & exothermic reactions	**Energy changes** Exothermic & endothermic Reaction profiles including use of catalysts Energy change of reactions TRIPLE CONTENT Chemical cells & fuel cells	**Quantitative Chemistry** Relative atomic and relative formula mass Balancing equations Moles Moles in gases & moles in solution Amounts of substances in equations Using moles to balance equations Limiting reactions TRIPLE CONTENT Yield & atom economy Titration Amount of gases	**Rates** Rate of reaction Collision frequency Reversible reactions Catalysis Reversible reactions Dynamic equilibrium TRIPLE CONTENT Haber process	*Redox, chemical equilibria*
				Chemical changes Strong and weak acids Concentration of solutions & pH Neutralisation Metal acid reactions Filtration and evaporation Oxidation & reduction Redox			
Chemistry: Earth & Resources		**Earth & Recycling** Rocks & the Earth Earthquakes & waves Atmosphere, air quality & pollution inc. acid rain Chemical & physical weathering	*(Atoms & Periodic Table)*	**Chemical changes** Reactivity Extraction of metals Extracting metals from low grade ore		**Atmosphere & Resources** Composition and evolution of the Earth's atmosphere Greenhouse effect and climate change Making rocks Making fossil fuels Atmospheric pollution Using resources and potable water Water cycle Recycling TRIPLE CONTENT NPK fertilisers Alloys Corrosion Glass, ceramic, polymer, composites.	*Organic chemistry*

Physics: Energy	*Light* *Straight lines* *Reflection to see objects* *Shadows*	**Energy** Energy stores Energy transfers Heat transfer by particles Heat transfer by radiation Energy from food Work done Power	**Waves - Sound** Transverse and longitudinal Properties of waves superposition Sound waves Sound and the oscilloscope The ear Hearing damage Echo and ultrasound Microphone and speaker	**Energy Stores** Energy stores & systems Conservation of energy Work done GPE KE EPE Efficiency Power	**Nuclear Radiation / atomic structure** History of the atom Atoms & isotopes Radioactive decay Nuclear radiation Half-life Hazards & uses of radioactive emissions and background radiation TRIPLE CONTENT Nuclear fission & fusion	**Waves** Transverse & longitudinal Properties of waves Wave speed calculations Ripple tank RP Speed of sound Reflection and diffuse vs specular waves and surfaces (reflected, transmitted absorbed and transparent, translucent and opaque) TRIPLE CONTENT Refraction Reflection Refraction RP Lenses	*Waves* *Thermal* *Radioactivity*
		Resources Structure of the earth Earthquakes Fuels and power stations Renewable and non renewable The cost of electricity	**Waves - Light** Light sources Light and surfaces How we see The law of reflection Refraction Lenses and the eye Camera obscura practical lesson Light and colour	**Energy resources** Comparing conventional power stations Wind and wave energy Tidal and hydro electric Solar Geothermal and data analysis Big energy issues (meeting changing demand)		**Electromagnetism** Communications (radio, microwave and optic fibre) Leslie cube RP UV, Xrays and gamma TRIPLE CONTENT Sound waves Waves for scanning Light colour and filters	
	Electricity *Brightness & voltage* *Components* *Symbols*		**Electricity & Magnetism** Static electricity and fields Potential difference, current and resistance Series circuits Parallel circuits Magnets Magnetic fields Electromagnets Using electromagnets	**Electricity in circuits** Current and charge Ohms law Resistance in a wire (RP) Series circuits Parallel circuits Resistors in series and parallel (RP) Component graphs Components RP Charge and energy TRIPLE CONTENT	**Domestic electricity** AC and DC Plugs and cables Fuses Power calculations The national grid	**Electromagnetism** Magnetic fields Fields and current The motor effect TRIPLE CONTENT Em devices Generator effect Alternator and dynamo Transformers Transformer calculations	*Electricity* *Electric &* *Magnetic Fields*
Physics: Forces	*Forces* *Gravity* *Types of force* *Transferring force*	**Forces** Introduction to forces Squashing and stretching Drag forces Friction Balanced forces Unbalanced forces Speed Fields Weight, mass and Gravity	*(forces)*	**Motion** Distance time graphs Velocity time Graphs More complex graphs of motion	**Forces and motion** Force and Motion Force and acceleration Weight and terminal velocity Forces and braking Momentum Force and elasticity (TRIPLE CONTENT) Conservation of momentum Impact forces	**Force and pressure** (TRIPLE CONTENT) Pressure and surfaces Pressure in a liquid Atmospheric pressure Upthrust and floating	*Mechanics*
					Forces in balance Vectors and scalars Forces between objects Balanced and unbalanced forces Centre of mass Parallelogram of forces Resolving Forces Newtons laws (TRIPLE CONTENT) Moments Gears		
	Earth & Space *Solar System* *Moon* *Day & Night*	*(Forces)*	**Space** The night sky The universe The solar system Days, months, years, and seasons Changing ideas	*(Motion)*		**Space** (TRIPLE CONTENT) Solar system & the universe Stellar evolution The Big Bang Theory Red shift The cosmic microwave background Orbits	*Circular and SHM* *Gravitational Fields*
Physics: Matter	*Properties of Materials* *Classify* *Dissolving* *States of matter*	**Particle Model** Changes of state and particle model melting and freezing Boiling and evaporation Brownian motion and diffusion Gas Pressure		**Energy transfer by heating** HEATING Conduction Specific heat capacity Insulation TRIPLE CONTENT Infra red Leslie cube practical	**Molecules & matter** Density Density RP States of matter Internal energy Heating and cooling Specific latent heat Gas pressure (Triple content) Gas pressure and volume	*(Application)*	*Particle Physics* *Materials*

Curriculum timeline 2024-25

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Time of Year	Year 7	Year 8	Year 9	Year 10	Year 11
Autumn 1	Particle model	Elements, mixtures & compounds	Cells and cell transport	Cell division	Homeostasis & response
	What is life?	Reproduction	Energy stores	Domestic electricity	Rates
					Electromagnetic waves
				Molecules and matter	Light (T)
				Bonding	Atmosphere & resources
Autumn 2	Elements, mixtures & compounds (AC)	Waves - sound and light	Atomic structure	Inheritance	Organic chemistry
	Energy		The digestive system	Radioactivity	*Mock Exams*
					Variation & evolution
Spring 1	Health & fitness	Breathing & Circulation	The heart & circulation	Defence & immunity	Electromagnetism
	Resources	Chemical analysis	Energy transfer by heating	Chemical analysis	Human Effects on Ecosystem
Spring 2	Forces	Chemical reactions	The periodic table	Forces in balance	Space (T)
					Mock Exams
		Electricity & Magnetism	The heart & circulation	Electrolysis	
Summer 1	Chemical reactions (AC)	Respiration	Energy resources	Bioenergetics	Revision
	Earth & recycling		Chemical changes	Forces & motion (inc graphs of motion)	
				Force and pressure (T)	
		Space		Quantitative Chemistry	*External Examination*
Summer 2	Ecology	Plant biology	Organising plants	Wave properties	*External Examination*
			Electricity in circuits	Adaptations	
	Summer Examination	*Summer Examination*	*Summer Examination*	*Summer Examination*	
	Application	cont.	Energy changes	Application	---
		Application	Application		