

Physics Curriculum Implementation (2020-2021)

KEY IDEAS	National Curriculum	AQA KS3 Syllabus			AQA GCSE specification		AQA A level Physics	
	KS2	KS3 Part 1 (Y7)	KS3 Part 2 (Y8)	KS3 Part 3 (Y9)	KS4 Part 1 (Y10)	KS4 Part 2 (Y11)	KS5 (Y12)	KS5 (Y13)
Forces	Earth and Space (movement of Earth, Sun and Moon) Forces (gravity; friction; levers, pulleys and gears)	Speed (speed; distance-time graphs) Gravity (mass and weight; gravity; orbits; varying gravity)	Contact forces (contact forces; deformation; linear relationships; friction) Pressure (pressure; fluid pressure; atmospheric pressure)	Forces (contact and non-contact forces; friction; speed and stopping distance)	P5 Forces (scalars and vectors; contact and non-contact forces; gravity; resultant forces; work; elasticity; speed and velocity; acceleration)	P5 Forces (Newton's Laws; forces and braking; momentum)	Mechanics (scalars and vectors; moments; motion along a straight line; projectile motion; Newton's Laws of motion; momentum)	Fields (gravitational fields; Newton's Law; gravitational field strength; gravitational potential; orbits of planets and satellites) Turning Points (Michelson-Morley experiment; Einstein's theory of special relativity; time dilation; length contraction; mass and energy)
Electro magnets	Electricity (brightness and voltage; circuit symbols; magnets; series circuits; conductors and insulators)	Voltage & resistance (series and parallel circuits; voltage; resistance; conduction and insulation; safety) Current (current; charge; electric fields; series v parallel)	Electromagnets (electromagnets; uses of electromagnets) Magnets (magnetic fields; magnetic materials)	Electricity and Magnetism (current; resistance; AC and DC; domestic electricity; power and energy; magnets; magnetic fields)	P2 Electricity (circuit symbols; series and parallel; AC and DC; mains electricity; power; the National Grid) P7 Electromagnetism (magnets; magnetic fields)	P2 Electricity (charge and current; resistance; LDR's; bulbs; thermistors; diodes) P7 Electromagnetism (electromagnetism; Fleming's Left Hand Rule; motors)	Electricity (current electricity; current-voltage characteristics; resistivity; circuits; potential divider; electromotive force and internal resistance)	Fields (Coulomb's Law; electric field strength; electric potential; magnetic flux density; moving charges in a magnetic field; magnetic flux and flux linkage; electromagnetic induction; alternating currents; transformers) Capacitance (capacitance; parallel plate capacitor; energy stored by a capacitor; capacitor charge and discharge) Turning Points (cathode rays; thermionic emission of electrons; specific charge of the electron; Millikan's experiment)
Energy		Energy costs (power; renewable v non-renewable; energy in the home) Energy transfer (energy stores; energy transfers; energy dissipation)	Work (work; making work easier) Heating & cooling (thermal energy; conduction, convection and radiation; insulation)	Energy (KE; GPE; EPE; efficiency; thermal conductivity; energy resources)	P1 Energy (energy stores and systems; power; energy transfers in a system; efficiency; national and global energy resources)	P1 Energy (KE; GPE; EPE; specific heat capacity)	Mechanics (work, energy and power; conservation of energy)	Thermal Physics (thermal energy transfer; ideal gases; molecular kinetic theory model)
Waves	Light (shadows; how we see) Sound (how sound is made; pitch, volume)	Sound (sound waves; volume and pitch; auditory range) Light (light colours; refraction; reflection)	Wave effects (energy transfer by waves; audio equipment; damage caused by waves) Wave properties (longitudinal v transverse; transmission)	Waves (transverse and longitudinal; wave properties; electromagnetic waves)	P6 Waves (transverse and longitudinal; wave properties; electromagnetic waves)	P6 Waves (transverse and longitudinal; wave properties; electromagnetic waves)	Waves (progressive waves; longitudinal and transverse waves; superposition and stationary waves; interference; diffraction; refraction at a plane surface)	Periodic Motion (circular motion; Simple Harmonic Motion; forced vibrations and resonance) Turning Points (Newton's corpuscular theory of light; Young's double slit; electromagnetic waves; discovery of photoelectricity; wave-particle duality; electron microscopes)
Matter				Structure of Matter (atoms and nuclear radiation)	P3 Particle Model of Matter (density; particle motion) P4 Atomic structure (structure of an atom; development of the model of an atom; radioactive decay; nuclear radiation; contamination and irradiation)	P3 Particle Model of Matter (changes of state; internal energy; specific heat capacity; specific latent heat) P4 Atomic structure (mass number; atomic number and isotopes; nuclear equations; half-life)	Particles (constituents of the atom; stable and unstable nuclei; particles, antiparticles and photons; particle interactions; classification of particles; quarks and antiquarks; application of conservation laws; photoelectric effect; collisions of electrons with atoms; energy levels and photon emission; wave-particle duality) Materials (bulk properties of solids; Young Modulus)	Nuclear Physics (Rutherford scattering; alpha, beta and gamma radiation; radioactive decay; nuclear instability; nuclear radius; mass and energy; induced fission; safety aspects)

Biology Curriculum Implementation (2020-2021)

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	KS2	KS3 Part 1 (Y7)	KS3 Part 2 (Y8)	KS3 Part 3 (Y9)	KS4 Part 1 (Y10)	KS4 Part 2 (Y11)	KS5 (Y12)	KS5 (Y13)
Organisms	<p>Roles of Skeleton and muscles. Nutrition from food (i.e. animals can't make their own food like plants do).</p> <p>Life cycles of a mammal, amphibian, insect and a bird. Reproduction in some plants and animals.</p> <p>Life cycles of Humans. Changes that happen during puberty.</p> <p>The name and parts of the human circulatory system and the functions of the heart, blood vessels and blood.</p> <p>Impact of diet, exercise, drugs and lifestyle.</p>	<p>Plant & Animal Cells, adaptations of cells, exploring cells (microscopes), unicellular Organisms, human skeleton, joints and muscles, interacting muscles, skeletal problems</p>	<p>Exchange surfaces in the lungs, digestion and enzymes in digestion, lung structure, breathing, lifestyle (smoking/diet/disease/asthma/deficiency diseases, leaf structure</p>	<p>B1 Cell Biology Cells and their structure, functions of structures, specialised cells. B2 Organisation of Organisms Organisation of organisms (tissues and organ systems), positions and jobs of major organs, label the digestive system and enzymes involved in digestion, circulatory system, the effect of lifestyle on health (inc. drugs, exercise and fitness) B3 Infection and response Types and causes of disease, how pathogens make us feel ill, vaccinations, antibiotics B5 Homeostasis & Response Reflexes (RP), hormones – what they are and where they are released from, control of menstrual cycle, control of fertility (contraception and IVF)</p>	<p>B1 Cell Biology Eukaryotes and prokaryotes, mitochondria and ribosomes, diffusion, osmosis, active transport B2 Organisation of Organisms Food tests (RP), RP enzyme action and pH and temp, blood vessels, cancer, plant tissues, organs and systems. B3 Infection & Response Drug trials and development, plant defence responses. B5 Homeostasis & Response Conditions we control and organs involved, nervous pathways, control of blood glucose levels, use of plant hormones.</p>	<p>B1 Cell Biology RP Microscopes, measuring cells, converting units, cell division – mitosis (time spent in each stage) and meiosis, stem cells and therapeutic cloning, revisit transport and include surface area : volume and implications for absorption of substance. B2 Organisation of Organisms Enzymes in the Digestive system - where they are made and where they work, Role of bile, Factors affecting health and circulation aids. B3 Infection & Response Review of Types of pathogens and diseases they cause, prevention of spreading, treatments of disease, antibiotic resistance, properties of plants to treat disease.</p>	<p>Biological Molecules (Carbohydrates, lipids, proteins, enzyme action, water, ATP, Inorganic ions) Cell Structure and Division (Cells and organelles, viruses, analysis of cell components, mitosis, RP squashes of root tip). Cell Membranes (structure, exchange – diffusion, osmosis, active transport) Immune System (white blood cells, immunity, vaccines, monoclonal antibodies, HIV and viruses, ELISA test). Exchange and Transport (size and surface area, gas exchange, lung disease, dissecting gas exchange systems, digestion and absorption, Haemoglobin, circulatory system, heart, heart disease, xylem and phloem in plants).</p>	<p>Stimuli and Response (nervous communication, responses in plants and animals (RP with maggots), receptors, control of heart rate). Nervous Coordination (neurones, synaptic transmission, muscle contraction) Homeostasis (homeostasis, control of blood glucose concentration, the Kidneys, controlling blood water potential).</p>
Ecosystems	<p>Structure of plants Resources plants need Flowers and reproduction (pollination, seed formation and dispersal).</p> <p>Transport of water in plants. Living things are grouped or classified.</p> <p>Environmental change and how this can affect living things. Basic function of the digestive system and the role of teeth, Food chains.</p>	<p>Fruits and seed dispersal, food webs, toxins, insects, ecological balance</p>	<p>Respiration – aerobic and anaerobic, fermentation, photosynthesis, test for starch, leaf structure, transport and plant minerals.</p>	<p>B4 Bioenergetics Photosynthesis B7 Ecology, RP, respiration – word equation and where it happens. Adaptations, feeding relationships (food chains), competition and factors that might affect the environment, measuring distribution – using quadrats, pollution, water cycle, carbon cycle and role of microbes in decay.</p>	<p>B4 Bioenergetics Symbol equations, uses of glucose, response to exercise B7 Ecology Biodiversity and its maintenance, deforestation and global warming, pyramids of biomass and transfer of biomass, farming techniques, sustainable fishing, biotechnology, opportunity to revisit genetic engineering.</p>	<p>B4 Bioenergetics Link photosynthesis to leaf structure, respiration and exercise – oxygen debt, metabolism – link to all chemical reactions we have covered. B7 Ecology Environmental change – caused by deforestation and global warming – link to distribution of organisms, competition and extinction. Evidence through data from sampling techniques, issues associated with a growing population – waste, land use, pollution, more food production</p>	<p>Diversity, Classification and Variation (Biodiversity)</p>	<p>Photosynthesis and Respiration (photosynthesis, respiration and ATP, limiting factors, experiments.) Energy Transfer and Nutrient Cycles (energy transfer in ecosystems, farming practices and production, nutrient cycles, fertilisers and eutrophication). Populations in Ecosystems (ecosystems, variation in population size, investigating populations, succession, conservation).</p>
Genes	<p>Fossils provide a record of organisms that inhabited the Earth million of years ago. Variation in offspring. Adaptations to the environment leading to evolution.</p>	<p>Flowering plants, fertilisation, variation – causes and importance, variation – causes and importance, reproductive systems, fertility, development of the foetus, pregnancy/factor affecting a foetus.</p>	<p>Genes, chromosomes and DNA, variation and causes, inheritance, natural selection, evolution, biodiversity, extinction.</p>	<p>B6 Inheritance, Variation and Evolution Evolution, fossils, natural selection, selective breeding, reproduction,, sex chromosomes/sex determination, genetic engineering.</p>	<p>B6 Inheritance, variation and Evolution DNA and the Genome, inheritance, inherited disorders, variation, extinction, classification</p>	<p>B6 Inheritance, Variation and Evolution Genetic crosses, counselling and screening for genetic disorders, ethics of screening, evolution – evidence to support natural selection – fossils (review formation) and bacteria resistance.</p>	<p>Biological molecules (DNA and RNA, DNA replication) DNA, RNA and Protein synthesis (DNA, Genes and Chromosomes, RNA and protein synthesis, Genetic code and Nucleic acids) Diversity, Classification and Variation (Meiosis and genetic variation, mutations, genetic diversity and natural selection, classification of organisms, DNA technology, classification and diversity,</p>	<p>Genetics (inheritance, linkage and epistasis, the Chi-Squared Test) Populations and Evolution (The Hardy-Weinberg Principle, variation, and selection, speciation and genetic drift). Mutations and Gene Expression (mutations, cancer, stem cells, regulation of transcription and translation, control of gene expression) Genome Projects and Gene Technologies (Genome projects and making DNA fragments, amplifying DNA Fragments, recombinant DNA technology, gene probes and medical diagnosis, gene fingerprinting)</p>

Chemistry Curriculum Implementation (2020-2021)

Key ideas	National Curriculum	AQA KS3 Syllabus			AQA GCSE specification		AQA A level Chemistry	
	KS2	KS3 Part 1 (Y7)	KS3 Part 2 (Y8)	KS3 Part 3 (Y9)	KS4 Part 1 (Y10)	KS4 Part 2 (Y11)	KS5 (Y12)	KS5 (Y13)
Matter	<p>States of Matter (grouping materials by state, changes on heating and cooling, research temperatures of changes of state, identify the role of evaporation and condensation in the water cycle)</p> <p>Properties of materials (hardness, solubility, transparency, conductivity and magnetism, separating mixtures, explaining the uses of everyday materials based on properties, identifying reversible changes and non-reversible changes)</p>	<p>Particle model (states of matter, diffusion, changes of state)</p> <p>Separating mixtures (filtration, distillation, evaporation, chromatography, solutions)</p>	<p>Periodic table (elements, metals, non-metals, patterns within the periodic table)</p> <p>Elements (Combining elements, compounds, polymers, ceramics and composites)</p>	<p>ELC 3.3: Elements, mixtures and compounds (atoms, elements in the periodic table, states of matter, metals and non-metals, diamond and graphite, polymers, combining elements to form compounds, properties of compounds, separating mixtures)</p> <p>ELC3.4: (crude oil, fractional distillation)</p>	<p>C1: Atomic Structure and the Periodic Table (Models of the atom, relative electrical charges of subatomic particles, size and mass of atoms, electronic structure, relative atomic mass, development of the periodic table, Group 0, Group 1, Group 7)</p> <p>C2 Bonding, Structure and Properties of Matter (Ionic bonding, ionic compounds, covalent bonding, metallic bonding, state symbols)</p> <p>C7 Organic Chemistry (properties of hydrocarbons, cracking and alkenes)</p>	<p>C2 Bonding, Structure and Properties of Matter (properties of ionic properties of small molecules, giant covalent structures, graphene and fullerenes)</p>	<p>Fundamental particles, isotopes, electron configuration</p> <p>Ionic bonding, nature of covalent and dative covalent bonds, metallic bonding, bonding and physical properties, shapes of molecules and ions, bond polarity, forces between molecules</p> <p>Periodicity - properties of group 3 elements</p> <p>Group 2 - the alkaline earth metals and Group 7 - the halogens, uses of chlorine and chlorate</p> <p>Organic nomenclature, Structural Isomerism, fractional distillation and cracking, structure/bonding in alkenes</p>	<p>Properties of Period 3 elements and their oxides</p> <p>Transition metals (general properties, substitution reactions, shapes of complex ions, formation, of coloured ions, variable oxidation states and use as catalysts)</p> <p>Reactions of ions in aqueous solution</p> <p>Optical isomerism</p>
Reactions		<p>Metals & non-metals (properties and uses of metals, reactions of metals and acids, displacement, oxidation)</p> <p>Acids & alkalis (acids, alkalis, indicators, neutralisation)</p>	<p>Chemical energy (exothermic reactions, endothermic reactions, catalysts)</p> <p>Types of reaction (combustion, use of fuels, thermal decomposition, conservation of mass)</p>	<p>ELC3.4: Chemistry in our world (reactions of acids, making salts, energy and rate of reaction)</p>	<p>C3 Quantitative Chemistry (conservation of mass and balanced equations, relative formula mass, mass changes where a reactant or product is a gas, chemical measurements, moles, using moles to balance equations, concentration of solutions)</p> <p>C4: Chemical Changes (metal oxides, reactivity series, pH scale and neutralisation, strong and weak acids, electrolysis of molten compounds, using electrolysis to extract metals)</p> <p>C5 Energy Changes (reaction profiles)</p> <p>C6 Rate and Extent of Chemical Change (calculating rate of reaction, collision theory and activation energy, catalysts, reversible reactions, energy changes and reversible reactions, equilibrium)</p> <p>C8 Chemical Analysis (pure substances, formulations, tests for gases)</p>	<p>C3: Quantitative Chemistry (Amount of substance in equations, limiting reagents)</p> <p>C4: Chemical Changes (Oxidation and reduction in terms of electrons, electrolysis of aqueous solutions, representation of reactions at electrodes as half equations)</p> <p>C5 Energy Changes (the energy change of reactions)</p> <p>C6: Rate and Extent of Chemical Change: (effect of changing temperature concentration and pressure on systems at equilibrium)</p>	<p>Relative atomic mass, relative molecular mass, ideal gas law, empirical and molecular formulae, balanced equations and associated calculations,.</p> <p>Energetics (enthalpy, change, calorimetry, Hess's Law, bond enthalpies)</p> <p>Kinetics (collision theory, Maxwell Boltzmann distributions, effect of temperature/ concentration/pressure on rate, catalysts)</p> <p>Chemical equilibria and Le Chatelier's principle, Kc, oxidation, reduction and redox equations</p> <p>Combustion and chlorination of alkanes</p> <p>Nucleophilic substitution and elimination</p> <p>Addition reactions of alkenes</p> <p>Alcohol production, oxidation of alcohols and elimination</p> <p>Organic Analysis (test tube reactions, IR spec, high resolution mass spec)</p>	<p>Thermodynamics (Born Haber, Gibbs free-energy change and entropy change)</p> <p>Rate equations</p> <p>Equilibrium constant Kp</p> <p>Electrode potentials and electrochemical cells, commercial applications of cells</p> <p>Acids, bases and buffers (Brønsted-Lowry acid-base equilibria, pH, Kw, weak acids and bases, Ka for weak acids, pH curves and titrations with indicators, buffer action)</p> <p>Aldehydes and ketones, carboxylic acids and derivatives, Acylation</p> <p>Aromatic chemistry – electrophilic substitution</p> <p>Amines – properties, base properties and nucleophilic properties</p> <p>Amino acids, proteins, enzymes and DNA, anticancer drugs, Organic synthesis, NMR, Chromatography</p>
Earth	<p>Rocks (compare and group rocks by simple physical properties, fossils, how soils are made)</p> <p>Earth and Space (movement of Earth and other planets relative to the sun, movement of the moon relative to Earth, cause of day and night)</p>	<p>Earth structure (structure of the Earth, igneous/sedimentary/metamorphic rocks, rock cycle)</p> <p>Universe (stars galaxies, Earth's motion, our neighbours in the Universe)</p>	<p>Climate (composition of the atmosphere, carbon cycle, global warming)</p> <p>Earth resources (damage to the Earth's resources, recycling, extraction of metals)</p>	<p>ELC 3.3 Elements, mixtures and compounds (extraction of metals)</p> <p>ELC3.4: Chemistry in our world (Earth's atmosphere, changes from early atmosphere, human activities, atmospheric pollutants, potable water, reducing use of resources)</p>	<p>C9: Chemistry of the Atmosphere (Greenhouse gases, carbon footprint and its reduction, atmospheric pollutants from fuels)</p> <p>C 10 Using Resources (Using Earth's resources and sustainable development, waster water treatment, life cycle assessment)</p>	<p>C 10 Using Resources (alternative methods of metal extraction)</p>	<p>Ozone depletion</p> <p>Addition polymers</p>	<p>Condensation polymers, biodegradability and disposal of polymers</p>