

Year	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
7	<p>We welcome Y7 with the fundamental concepts of biology and chemistry that build upon their KS2 learning and form a foundation for the rest of Ks3, 4 and ongoing science education beyond ARK Charter. Students begin to develop practical skills through microscopy, evaluate scientific models and analyse data to draw conclusions.</p> <p>B1.1 Cells Cell Structure Specialised Cells Microscopy Cell Organisation</p> <p>C1.1 Particles The Particle Model Changes of State Diffusion</p>	<p>Students build upon their knowledge of the fundamental units of life (cells) by studying how organisms reproduce. Students embark upon their physics education by learning about forces and how these bring about change in the world around them. Students apply mathematical principles to calculate resultant forces and manipulate the density equation.</p> <p>B1.2 Reproduction Sexual and Asexual reproduction Puberty The Menstrual Cycle Embryo Development Plant reproduction</p> <p>P1.1 Contact Forces Balanced and unbalanced forces Resultant Force Friction Density</p>	<p>This half term students begin linking their concept of particles with the actual chemicals those models represent and why different chemicals behave in different ways. Their appreciation of forces is applied to gravity as students begin to develop the skill of rearranging equations.</p> <p>C1.2 Elements, Atoms and Compounds Chemical symbols Elements and Compounds Metals and Non-Metals</p> <p>P1.2 Gravity Mass and Weight Gravity</p>	<p>Students expand the scope of their understanding of living organisms into the links between organisms and non-living aspects of their ecosystems, which builds on their KS2 experience of food chains and simple ecosystems. Taking their understanding of gravity further, students learn about the solar system and satellites.</p> <p>B1.3 Interdependence Ecosystems Feeding Relationships Competition Biotic and Abiotic Factors</p> <p>P1.2 Gravity The Solar System Satellites</p>	<p>With students appreciating the differences between chemicals from spring 1 and able to draw particle diagrams from autumn 1, we can now bring in concepts of purity, mixtures and separating impure mixtures. We introduce energy transfers at this stage as another underpinning physics concept upon which much of the physics and chemistry curriculum relies.</p> <p>C1.3 Mixtures Pure and Impure substances Melting and Boiling Separating Mixtures Solubility</p> <p>P1.3 Energy Transfers Energy and Energy Transfers Wasted Energy Heat and Temperature</p>	<p>In their final half term of year 7, students have an opportunity to apply their understanding of energy, backed by their KS2 experience of simple electrical circuits to current, potential difference and how electricity behaves in different circuit layouts.</p> <p>P1.4 Electric Circuits; Current and PD Series and Parallel Circuits Electric Current Potential Difference</p>
8	<p>Students apply their understanding of cells to the more complex tissue and organ structures needed for complex organisms to have</p>	<p>This half term students utilise their knowledge of tissues and organs and chemical reactions from autumn 1 to explain the biochemical reactions fundamental to</p>	<p>Students take their fundamental understanding of the cell and explore how cells contain the information required for all the complex organisms on</p>	<p>During spring 2 students apply their understanding of chemical and physical changes to material cycling on Earth. From summer 2 in year 7</p>	<p>Now that students have an understanding of tissues, organs and organ systems, these can be tied together by learning about diet, nutrition and digestion.</p>	<p>In summer 2 students complete their learning about light and spend some time reflecting, revising and the teaching team re-teach content identified as group and</p>

	<p>evolved and how these systems behave and interact with each other and changing environments. Building on all of Y7 chemistry students apply their understanding of particles, chemicals and mixtures to explain the nature of acids and alkalis. From forces in Y7 autumn 2 students develop an understanding of movement and pressure, combining this with energy from Y7 summer 1 students can begin to understand the meaning of 'work done'.</p> <p>B2.1 Tissues and Organs Gas exchange Skeletal & Muscular Systems Recreational Drugs</p> <p>C2.1 Acids and Alkalis The pH scale Neutralisation</p>	<p>life and how chemicals can change both chemically and in terms of their state.</p> <p>B2.2 Respiration & Photosynthesis Aerobic respiration Anaerobic respiration Photosynthesis</p> <p>C2.2 Changing Substances Chemical and Physical changes</p>	<p>Earth and how humans impact evolution through selective breeding for desirable traits. Building upon the changing substances topic, students expand the scope of their appreciation for chemical reactions into acid/metal reactions and naming the compounds produced.</p> <p>Students study the basics of magnetism and tie this to their developing knowledge of circuits in terms of creating electromagnets.</p> <p>B2.3 Life Diversity Variation Selective Breeding Adaptation</p> <p>C2.2 contd. Oxidation Acids and Metals</p> <p>P2.2 Magnetism Magnetic Force Magnetic Fields Electromagnetism</p>	<p>students have a fundamental understanding of electrical circuits, which they expand into resistance and ohm's law.</p> <p>C2.3 Earth Systems The Rock Cycle The Water Cycle Combustion</p> <p>P2.3 Electric Circuits; Resistance Resistance Ohm's Law Measuring Resistance</p>	<p>Towards the end of Y8 students recall their KS2 learning about light and apply it to a new fundamental of physics, the properties of light as a wave and its behaviour.</p> <p>B2.1 Tissues and Organs Diet & Nutrition Digestive System</p> <p>P2.4 Light Properties of Light Reflection Refraction</p>	<p>individual weaknesses throughout Y7-8 to shore up any gaps in knowledge and skills before moving into year 9.</p>
--	--	---	---	---	---	--

	P2.1 Movement and Pressure Speed Distance-Time Graphs Work Done Pressure					
9	<p>As we begin year 9 students build upon the knowledge they gained early in year 7 about cells, adding further details in terms of how cells interact with each other and organisms' internal environment. Students also call on their knowledge of atoms and elements to explain why chemicals behave differently to each other depending on their tiniest structures.</p> <p>B3.1 Growth & Differentiation Eukaryotic and Prokaryotic cells Cell Transport Cell Division Stem Cells</p> <p>C3.1 The Periodic Table</p>	<p>From their learning in Y7 (ecosystems) and Y8 (life diversity) students develop their understanding of how humans study and affect the Earth's ecosystems. Bringing together learning from Y7 (forces, energy) and Y8 (movement), students study Newton's laws and the calculations involved in finding the acceleration of objects.</p> <p>B3.2 Human Interaction Biodiversity Global Warming Food Security Biotechnology Sustainable Farming Pyramids of Biomass</p> <p>P3.1 Acceleration Vectors Newton's First Law Newton's Third Law Velocity-Time Graphs Acceleration</p>	<p>Students bring together concepts of energy and acid reactions with their developing mathematical skills in order to explore quantitative chemistry. In Y7 summer 1 students gained the foundations to prepare them for thermal energy transfers and specific heat capacity in this half terms physics topic.</p> <p>C3.2 Matter and Energy Atom Conversion Moles Yield, atom economy (S) Amounts of Substances Concentration Acids and Salts Titrations (S) Gas volume (S)</p> <p>P3.2 Heating Thermal Transfer Infra-red (S) Specific Heat Capacity Pressure (S)</p>	<p>In spring 1 of Y8 students began to understand how humans leverage our understanding of variation to selectively breed organisms, they now learn the underpinning aspects of genetics and how scientists can directly control the evolution of species via genetic engineering and understand the inheritance of characteristics between individuals. Various aspects of chemistry throughout Y7 and 8 are needed for students to understand how we utilise technology to maintain potable water supplies.</p> <p>B3.3 Genetics Sexual and Asexual reproduction Genes and DNA Genetic Engineering Cloning</p>	<p>Continuing from last half term students consider how we access and use Earth's resources in manufacture and therefore have to be aware of the environmental impact we can have through analysing product life cycles.</p> <p>In Y8 summer 1 we introduced students to light and now are able to deepen their understanding of other waves and their applications. Lastly, we draw together all the previous work students have done on electricity and circuits to consider how electricity is used safely in the home and everyday life.</p> <p>C3.3 Using Resources Product Life Cycle</p> <p>P3.3 Sound and Waves</p>	<p>As students prepare for their end of year 9 assessments we spend summer 2 in re-teaching and revision as well as exam technique practice so that students can be as successful as possible before entering into their GCSEs.</p>

	<p>Transition elements (S)</p> <p>Subatomic particles Isotopes The Atomic Model Periodic Patterns</p>			<p>Monohybrid Inheritance Gene Theory</p> <p>C3.3 Using Resources The Reactivity Series Potable Water</p>	<p>Longitudinal and Transverse Wave Properties Sound Waves (S) Seismic Waves (S) Ultrasound (S)</p> <p>P3.4 Home Electricity Mains Electricity Electrical Appliances The National Grid Static Electricity</p>	
10	<p>As students begin their GCSEs, they recall the fundamentals of cellular biology and apply these to the tissues and organs of various systems, starting with the circulatory system. Following their grounding in the fundamentals of chemistry students study how various factors affect the rate of reaction, including how these impact chemical yield in industry.</p> <p>B4.1 Organ Systems The Heart & Blood</p> <p>C4.1 Controlling Reactions Rates of Reactions</p>	<p>Moving to another organ system students learn the anatomy and physiology of the nervous system. In chemistry students learn the material science aspects of how particles are held in different structures by electrostatic forces and that the behaviours of different elements and compounds they learnt about previously are dictated by their structure and bonding. Students apply their understanding of movement and forces to their understanding the physics of more complex systems</p> <p>B4.1 Organ Systems The Nervous System</p>	<p>In autumn 2 of year 8 students learnt about photosynthesis and some associated plant tissues and organs. Together with their basic understanding of some material cycles in Earth's ecosystem students can learn the details of plant structure for the movement of materials within the organisms and their place in the material cycles. In Y9 spring 1 students studied the foundational concepts for appreciating the conservation of energy within systems and the importance of various energy resources for our future energy needs</p> <p>B4.2 Plants and Material Cycling</p>	<p>As students developed their understanding of organ systems in the autumn term of Y10 they can layer over this new learning about health and disease and its impact on body systems. Through understanding how atoms of elements interact and how compounds can be separated, students can learn how to analyse what chemicals are using a variety of techniques. Building upon all the electricity, circuits and magnetism learning students have worked on throughout KS3 we now add the final layer of complexity for GCSE circuits, with various inputs and outputs, induced current and transformers</p>	<p>In the final biology topic of Y10 students study the body's defences against disease and how drugs are developed to protect the biological processes they have studied throughout KS3 and Y10 so far. Carbon chemistry draws upon students' previous learning of chemical equations, reactions and structure to understand some of the most important chemicals to modern society; hydrocarbons. Radioactivity builds on the knowledge students have developed about atoms, nuclei, energy and waves</p> <p>B4.1 Organ systems Defence against Disease Development of Drugs</p>	<p>As students near their end of Y10 assessments, which are the first time they will experience full GCSE papers (though, only paper 1 at this stage), we spend summer 2 in re-teaching and revision as well as exam technique practice so that students can be as successful as possible before entering into their final year of GCSE.</p> <p>B4.3 Variation & Evolution Cloning (S) History of genetics (S), theories of evolution (S) speciation (S)</p> <p>Evidence for evolution, extinction, bacterial resistance, classification, adaptation, interdependence and competition</p>

	<p>Reversible Reactions The Haber Process and NPK fertilisers Yield Electrolysis</p>	<p>The brain, eye & problems with the eye (S)</p> <p>C4.1 Structure & Bonding Ionic, Covalent & Metallic Bonding and Properties Nanoparticles (S) Polymers (S) Metals & Alloys Bond energy Chemical cells, batteries, hydrogen fuel cells (S)</p> <p>P4.1 Movement Vectors, scalars Resultant forces Moments, Levers and Gears (S) Newton's Second Law Stopping Distances Momentum Using conservation of momentum, impact forces & safety (S) Forces & elasticity</p>	<p>Plant Structure Transpiration Material Cycling Decomposition Disease in Plants Plant defence and disease (S)</p> <p>P4.2 Energy Conservation Energy Systems Specific Heat Capacity and Latent Heat Gas pressure & volume (S) Power Energy Resources</p>	<p>B4.1 Organ systems Health & Disease Bacterial growth (S)</p> <p>C5.1 Chemical Analysis Formulations Chromatography Tests for Gases Flame Tests Tests for Ions (S) Instrumental analysis (S)</p> <p>P4.3 Electrical Circuits Electrical charges and fields (S) and Energy Current, PD and Resistance Induced Potential Transformers</p>	<p>Monoclonal antibodies (S)</p> <p>C5.2 Carbon Chemistry Allotropes of carbon Crude Oil Chemistry of Hydrocarbons Organic reactions (S)</p> <p>P4.4 Radioactivity Radioactive Decay Half Life Radiation in medicine (S) Nuclear equations Background radiation Nuclear Fission (S) Nuclear Fusion (S)</p>	
11	<p>Moving into Y11 students are recalling a wealth of aspects of their organs and systems knowledge to understand how the body responds to stimuli, including its own hormone pathways. They also learn how medical</p>	<p>Students increased understanding of chemistry and physics enables them to appreciate the importance of the balance in the Earth's atmosphere and how this changes over time, including the impact of</p>	<p>After the winter break, students wrap up any remaining topics that are incomplete and then begin re-teach and revision of areas identified by mock examination and other prior data together with significant exam practice both guided and independent, to best prepare them for success in their final examinations.</p>			

<p>science is able to assert some control over the process of human reproduction by affecting various pathways and interactions.</p> <p>B5.1 Feedback & Control Homeostasis The Endocrine System Plant Hormones (S) The Brain The Eye Homeostasis in action (S)</p> <p>B5.2 Controlling Reproduction Sexual & asexual reproduction (S) Reproductive Hormones Contraception Infertility Treatments DNA structure & expression (S)</p> <p>B5.3 Ecology Organisation of ecosystems Decomposition (S) Human interaction; pollution, habitat destruction, global warming</p>	<p>human activity on the atmosphere. Leveraging students' knowledge of waves they study electromagnetism and how the various waves of the EM spectrum behave and can be utilised. The final topic of GCSE leverages all the work done on electricity and magnetism previous to explain various force fields and how they interact and ties together electromagnetism and gravity to explain the prevailing theory of the beginning of the universe; that of the big bang.</p> <p>C5.2 Atmosphere Earth's Atmosphere Climate change Combustion Fuel Cells Using Earth's Resources (S)</p> <p>P5.1 Electromagnetic Radiation E.M. Waves Lenses Visible Light Reflection, refraction, lenses (S) Black body radiation</p>
--	--

	<p>Climate change (S) Biodiversity Trophic levels & biomass (S) Food security (S)</p>	<p>P5.2 Force Fields Magnetic Fields Electromagnetism (S) The Motor Effect Generators (S) Transformers (S) Space Physics (S) Red Shift and the Big Bang Theory (S)</p>
--	---	--