Science Curriculum Overview, 2021-2022	
Why do we teach Science at Ark BDA?	Students at Ark Burlington Danes study science because it is a fundamental to the way we live and developing our futures. Scientific knowledge will allow students to solve practical problems, make informed decisions, and have the future potential to develop new technologies. The scientific mindset that we teach our students will be key to them being able to identify problems, assess those problems and devise solutions to these problems using science knowledge. These skills will allow them to engage with the world around them, making informed decisions based on science knowledge and principles. The goal of science education is not knowledge of a body of facts and theories but a progression towards key ideas which enable understanding of events and phenomena of relevance to students' lives. The knowledge students have developed will be useful in several different ways and will build up incrementally through the key stages. We will sequence core knowledge to enable deeper student understanding, for example the basic understanding of materials in key stage 2 and why certain materials are used for different purposes. To understanding why fibre glass is a good insulator in KS4 and possibly designing new stem cell treatments or developing new Nano batteries for mobile phones in KS5. It is necessary to teach science and the scientific method to help students develop their reasoning and practical skills. Students that don't get a science education miss out on the scientific enquiry method: take a question, use evidence to form an explanation, connect that explanation to existing knowledge and communicate that evidence-based explanation. We want students to have those critical thinking skills, problem thinking skills to make decisions. Problem solving, and critical thinking are two of the most important skills students learn in school. They are essential to making good decisions that lead to achievement and success during and after school. Science is one of the most important subjects in school due to its relevance to students' lives and the universally applicable problem-solving and critical thinking it uses and develops. These are lifelong skills that allow our students to generate ideas, weigh decisions intelligently and even understand the evidence behind decision making. A science education allows students to make connections to the world around them it is empowers them but also allows them to adapt and have insights to new advances in the scientific world.
How do we deliver our Christian values in science?	At Burlington Danes we are proud of our Christian values and we expect all teachers to embed them into their science teaching. Teachers are tasked with giving our students the confidence and self-belief to lead a happy and fulfilled life by encouraging them to aim high, be brave, be kind and keep learning. Students are encouraged to aim high in science; regardless of their starting position we ask them to target the best possible grade and mark they can in any work they are doing. 2 Corinthians 13:11 states to "aim for perfection" and we embody this in our science lessons. We have high expectations of all pupils, we create high standards for all and we ensure we have high quality teaching in our science rooms. Students are taught to always find ways they can improve and better themselves and their understanding of science concepts. Instilling that skill of not settling and aiming for better will help them in an ever-changing world where you will always need to be better and adaptable. Students need to be brave in science, they have to be able to learn from mistakes like lots of highly respected scientists did in the past. 1 Chronicles 28:20 states David said to Solomon "be strong and courageous and do the work". We show students that being brave can be putting your hand up to answer question, being patient when learning new science concepts and not giving up at the

	first hurdle. Having this skill will enable our students to not be afraid when moving on from BDA and making sure they engage with the world around them. Being kind is an important human value, we expect our students to act kindly, listen carefully and speak sensibly. Kindness is not simply being nice, its courage and discipline, it should be constant and unchanging. Ephesians 4:32 states "be kind to one another, tender hearted, forgiving one another, as God in Christ forgave you." Scientists have dedicated their lives to scientific work and developing new technologies that help us live a better life. There is nothing kinder than leading a life that will help thousands of people. Students are encouraged to keep learning, we show how scientists of the past and present make mistakes but that it didn't stop them and they continue to learn to overcome the mistakes they have made. Proverbs 1:5 states "Let the wise hear and increase in learning, and the one who understands obtain guidance". We expect our students to be determined to reach their goals in all areas of their life. This may not be in science but the skills they have developed in learning science will help them reach their goals in other areas. Learning science has several advantages; the more science learning they do, the more chance they will be able to make connections building up knowledge to help the world in the future.
How do we build core skills and knowledge over time?	During key stage 1 and 2 science tries to be as hands-on as possible: students are given the opportunities to experience science in the real world. Units are fun, challenging and intriguing, stimulating children's curiosity and translating into meaningful experiences. Hands-on exploration both inside and outside the classroom cement their understanding of important scientific concepts. During key stage 3 students build on the knowledge they have from key stage 1 and 2. We follow a coherent 5-year curriculum that every lesson is connected to, with a sophisticated interleaving of knowledge, practical and enquiry skills, mathematics and communication The Science Mastery 5-year curriculum map is organised under the 'big ideas' of science. This allows pupils to make links between topics, building ideas into a coherent picture of how the world works. Presenting new information under the umbrella of a familiar 'big idea' helps pupils to recognise the connectedness of science, and also how each new topic connects to everyday life and familiar contexts. This approach allows for the planned interleaving of prior learning with new learning in a meaningful way. We use engaging lessons, practical work and a real focus on science in their everyday lives to make sure they have the fundamental knowledge to progress. Teachers use low stake quizzes, mini-assessments, homework's, exam paper questions and mock exams to test students are understanding the material. Retention of material over time is important to understanding more challenging concepts, and teachers use trackers to monitor pupil progress and identify gaps in student knowledge and make changes to their teaching plans. Our science teachers are experts in their field and they share their knowledge of the curriculum through different methods, including teacher instruction, presentations, articles, discussions and homework activities. Lessons follow the same format. Lessons begin with retrieval practice using low stakes quizzing interleaved with connected topics and prior learning. Teachers should use pupils' responses to these questions as the starting point to inform their decisions about how the lesson should progress. Teachers reflect on prior learning through responses to diagnostic multiple choice and use a fix-it task to ensure misconceptions are challenged at the earliest time. Teachers will deliver new learning content by connecting it to prior learning and students own experiences. A check for understanding follows the teaching of any new information. This is a low-stakes formative assessment activity, providing the teacher with a quick snapshot of pupils' understanding. These are carried out using simple whole-class assessment strategies. Through teacher modelling students will build up their own independence to

	complete tasks with fluidity and confidence. Students are again assessed on this information by either teacher-designed questions or exam questions depending on the key stage. The final part of the lesson brings everything they have learnt together with a diagnostic exit ticket to check learning at the end of each lesson. This consists of three carefully written multiple-choice questions, which will identify the key misconceptions from the lesson that are most common according to the latest research. Teachers in science monitor students' progress on activities in lesson by circulating and noting down observations and doing whole class feedback lessons after a topic and mini assessment has been completed. Students are assessed centrally by ARK with ARK common assessments which are sat twice a year: results are sent home and used to change setting arrangements in science. The results of students throughout key stage 3 will enable us to decide who goes on to study separate science and who goes on to do combined science. Separate science allows students to gain 3 GCSEs in biology, chemistry and physics and combined science allows students to gain 2 GCSEs. Students who are aiming to do A levels in science are advised to do separate science as more content is covered which directly links to topics in the A level sciences. Academic progress is important when guiding our decisions for separate sciences in key stage 4 and A level in key stage 5 but a good attitude, willingness to work and a desire to move into a scientific field is also looked upon favourably. A level science builds heavily on skills that have been developed from key 2 and 3. To complete the A level in any of the three sciences students will need to have the necessary practical skills. We start teaching practical skills in key stage 2 where science is very hands on. In key stage 3 we introduce the scientific model and try to get students thinking in this format to identify and solve problems. During key stage 4 students are given a science practical lab book that covers all the practical aspects of science. They develop a better understanding of the key terms and learn how to use these terms correctly when writing up their science practical's. Teachers monitor and mark these lab books checking student progress and understanding.
How does the study of science prepare students for life beyond Ark BDA?	From KS1 onwards, students will have been encouraged to ask questions and seek answers based in accurate science, to begin to explain the world around them. Not only will students have a good general knowledge of science when they leave BDA, but they will also have skills that will enable them to function in the world around them. Practical skills, functioning skills reasoning skills and analysis skills are all embedded throughout the teaching of science and these skills are transferable to the wider world. Students that have an interest in science will have lots of different avenues open to them. Exciting careers await such as medical sciences, engineering, astrophysics, space technology, marine biology, medical sciences, military sciences, nuclear chemistry, scientific sales, veterinary sciences and many more. Our science course combines relevant, inspiring, practical and challenging work which prepares all students for an ever-changing world. They may not go on to be a marine biologist or nuclear chemist, but they will have developed skills and expertise to function in whatever career they choose. The ability to identify a problem, the ability to use evidence to try and solve that problem and in some cases base their solutions on science or by using the scientific method. Science offers a powerful platform for building confidence, developing communication skills and making sense of the world around us, a world that is increasingly being shaped by science and technology.
Implementation	During KS3 and KS4, we follow a coherent 5-year curriculum that every lesson is connected to, with a sophisticated interleaving of knowledge, practical and enquiry skills, mathematics and communication. Big ideas of Science Education were published by Wynne Harlen and others in 2010. These ideas distil down scientific knowledge into ten guiding principles that we can use to explain a diversity of scientific phenomena. The big ideas are lenses by which we can make sense of the world – an important goal for science education.

	At KS3 there are 4 science lessons a week, with homework given once a week to consolidate the learning that has been done. This is usually retrieval practice for prior learning to ensure content is revisited frequently. Students are taught in classes based on data from primary school and teachers use their differentiation skills to scaffold and challenge students depending on their ability. Towards the end of year 9 students are streamlined into either separate science where they will study biology, chemistry and physics separately or they will do combined science where they study all 3 topics together. BDA has specialist teachers for Biology and Chemistry and students will be taught by experts in their fields if they go on to do separate science. BDA is looking to recruit a physics specialist for KS4, but has a subject expert at KS5. The content in separate science is more challenging and it we expect students that do separate science to go on and do an A level in one of the sciences. In year 10 students that do combined science will have 5 science lessons a week, moving to 6 in year 11, this will be spilt between doubles and singles, enabling teachers to plan practical lessons and have time to really embed the learning and key objectives in the lesson. Separate science students will have 7 lessons of science a week in year 10, and 6 in year 11, and again they will have a double and a single, allowing teachers to do practical lessons effectively. Year 12 and 13 students have 7 lessons of their chosen science a week. Lessons in science follow the following format, lessons always start with a 'do now' activity that is a recap of previous learning, this could be in the form of a low stakes quiz or a word fill activity, there is a hook that engages the student, and this is the time where new information is presented to the class via teacher talk, reading or a presentation. Students are assessed on the new information using different assessment for learning strategies including true or false or multiple-choice quizzes. Students are then given the chance to do some independent work on the information, this could mean answering questions set by the teacher or writing a paragraph that uses several key words in the right context. The teacher will always produce a model answer and identify gaps in the students learning by listening to answers and reading through work. Finally, the consolidation activity brings all the learning together and allows students to leave the lesson understanding what the key takeaways are. Topics in science last for a round 2-3 weeks, and at the end of every topic students will be assessed using a mastery quiz in year 7 and 8 or exam questions in year 9 – 11. The assessments are designed to test what students know and understand, test whether they can apply that knowledge in different contexts and finally their ability to analyse and interpret scientific information. They follow the same format of the AQA exams which are divided into the same strands, A01 – knowledge and understanding, AO2 – applying knowledge, and AO3 – evaluating scientific ideas and information. We want students to get into the habit of working on these skills from a young age so that they are used to type of questions exams use. Once an assessment has been completed teachers use a fast feedback method to showcase what went well but also focus on what could be improved. Students receive there papers back with a mark and points of improvement. The teacher will also take the time to reteach parts of the topic that he or she thinks students did not fully understand.

	The science curriculum is very content heavy, there is a lot of information that students need to learn and remember. Therefore, it is recommended that students buy revision guides to help with consolidation homework activities, but the science team have also embedded revisits to topics previously taught. The homework set in KS3 and KS4 always uses appropriately space and interleaved retrieval practise to revisit connected or prior learning in order to build up the students schema and long-term memory over time. Interleaving information makes it clear where this knowledge sits within the wider context of pupils' learning, and within the big ideas of science.
Impact	Students in key 3 – 5 are assessed regularly throughout their time at BDA. In lessons pupils will self-assess according to the teachers' model answer. The teacher will check for understanding at key opportunities in the lessons to ensure all students are ready to move on and to identify and correct misconceptions. The teacher will read through students work and make corrections were necessary. Students are assessed at the end of every topic with low stakes diagnostic multiple choice questions followed by a feedback lesson addressing all misconceptions and gaps raised. During autumn 2 students do a ARK common assessments, these are assessments that all ARK schools do and this gives our teachers an idea of the impact their teaching is having on students. The second ARK common assessment is during the summer 2 term. The ARK common assessments allow us to test students understanding of the topics they have studied but also previous topics from previous years. Take for instance a year 9 pupil sitting an ARK common assessment in year 9 autumn 2. That assessment will have questions from topics taught in year 7 and 8. This allows students to constantly revisit information that was taught very early on, doing it this way enables students to keep the information in their long-term memory. All data from these ARK common assessments is shared with students and parents.

Subject Overview

	Autumn 1	***Autumn 2***	***Spring***	***Summer 1***	***Summer 2***
Early Years	6 weeks of lessons 2 hours per week	6 weeks of lessons 2 hours per week	10 weeks of lessons 2 hours per week		
Nursery	My body/ My senses	My neighbourhood (shops)	Solar System Planets		Minibeasts and Life Cycle Mammals

		Other environments	Stars and satellites		Birds, Fish Amphibians and Reptiles.
Reception	My body and my senses	My neighbourhood (shops) Other environments	Solar System Planets Stars and satellites		Minibeasts and Life Cycle Mammals Birds, Fish Amphibians and Reptiles.
KS1					
Year 1	Everyday Materials	Autumn & Winter	Amazing Animals	Spring & Summer	Plants
Year 2	Animals: Needs for survival	Uses of materials	Habitats	Protecting our environment	Plants: Bulbs & growth
KS2					
Year 3	Skeletons & Muscles	Rocks & Fossils	Light & Shadows	Plants: Needs for survival	Forces & magnets
Year 4	Teeth & Digestion	States of matter	Classification & environments	Sound	Electricity
Year 5	Earth & Space	Forces	Materials: Properties & changes	Life cycles	Growing old
Year 6	Light & Perception	Classification	Evolution & inheritance	Electricity	Circulation & lifestyle

		Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
Year 7	Topic	• Intro to lab science • Cells • Particle model	• Forces • Reproduction	• Atoms, Elements and Compounds • Gravity	• Inter-dependence	• Energy Transfers • Mixtures	• Electric Circuits
	BIG IDEA	***Cells are Alive*** Cells are alive; all living things are composed of cells, both singly and in multicellular organisms, working together as tissues, organs and organ systems. The exchange of substances between cells and their environment allows the life processes to occur, fueled by the organelles within performing their function. Differentiated cells allow living things to thrive in a huge variety of habitats.	***Forces predict motion*** The ways in which objects move depends on the forces acting on them. If the forces acting on an object are unbalanced, the object will change its speed, direction or shape. The behavior of objects in motion follow mathematical laws that can be used to make predictions about speed, distance travelled, the time taken and acceleration.	***Structure determines properties*** Matter is composed of atoms; atoms can link together and arrange in a variety of ways leading to the formation of different structures. This behavior and arrangement of atoms explain the properties of different materials. ***Fields produce Forces*** Objects can have an effect on other objects without touching them. In some	***Organisms are inter-dependent*** Living organisms may form populations of single species, communities of many species and ecosystems, interacting with each other, with the environment and with humans in many ways. Living organisms are interdependent and rely on other organisms in their community to survive and reproduce.	***Energy is Conserved*** Energy cannot be created or destroyed, although it can be transferred from one store to another. Different events can be explained in terms of the energy transfers involved. Energy can be transferred in useful ways for example for transportation, heating and to	***Electricity transfers energy*** An electrical current is the flow of charge and is a way of transferring energy. The electricity that we rely on for everyday use is generated in power stations and transferred to homes and businesses using the National Grid. Electrical devices use circuits with various components to transfer energy in useful ways

		Structure determines properties Matter is composed of atoms; atoms can link together and arrange in a variety of ways leading to the formation of different structures. This behavior and arrangement of atoms explain the properties of different materials.	***Characteristics are inherited*** Genetic information in a cell is held in the chemical DNA. All living things have DNA, which is passed from parent to offspring during reproduction. A section of DNA which is responsible for a particular protein (or part of the body) is called a gene. Genes determine the development and structure of organisms	cases, the effect travels out from the source to the receiver in the form of radiation. In other cases, action at a distance is explained in terms of the existence of a field of influence between objects such as a magnetic, electrical or gravitational field.		generate electricity. In these processes, some energy becomes less easy to use. ***Structure determines properties*** Matter is composed of atoms; atoms can link together and arrange in a variety of ways leading to the formation of different structures. This behavior and arrangement of atoms explain the properties of different materials.	
	Content	Introduction to science ***Cells*** Animal cells Plant cells Microscopes Using a microscope Observing cells Specialised cells Organising cells ***States of matter*** The Particle Model Properties of the states of matter Melting and Freezing Boiling and Condensing Diffusion Investigating Diffusion Gas pressure	***Forces*** Balanced or unbalanced forces Resultant Forces Interaction pairs Springs and deformation Drag Forces and Friction Practical – Friction ***Reproduction*** Sexual and Asexual Reproduction Puberty and the Reproductive System The Menstrual Cycle Embryo Development Plant Reproduction Practical Plant Reproduction Feedback Lesson	***Atoms Elements and Compounds*** Elements Atoms The Periodic Table Metals and non-metals Compounds Making iron sulfide Chemical formulae Feedback Lesson ***Gravity*** Mass and Weight Keeping in Orbit The Solar System Satellites Seasons Eclipses	***Interdependence*** Ecosystems Feeding Relationships Competition Biotic and Abiotic Factors	***Energy Transfers*** Energy and Energy Transfers Wasted Energy Heat and Temperature ***Mixtures*** Pure and Impure substances Melting and Boiling Separating Mixtures Solubility	***Electric Circuits; Current and PD*** Series and Parallel Circuits Electric Current Potential Difference
	Assessment	Mastery quiz In class assessment	Mastery quiz ACA	Mastery quiz In class assessment	Mastery quiz ACA	Mastery quiz In class assessment	Mastery quiz ACA

Year 8	Topic	• Tissues and Organs • Acids and Alkalis	• Movement and Pressure	• Respiration and Photosynthesis • Changing Substances	• Magnetism • Life Diversity	• Electric Circuits (Resistance) • Earth Systems	• Light
	Big Idea	***Reactions rearrange matter*** In chemical reactions, atoms are rearranged to form new substances. All chemical reactions involve the rearrangement of atoms. The numbers and types of atoms are the same before and after a chemical reaction. We can represent these reactions using equations. ***Bodies are Systems*** Cells work together as tissues. Tissues work together as organs. Many organs work together as organ systems. Multicellular organisms (such as humans, animals and plants) are able to survive because many organ systems work simultaneously to carry out the 7 life processes. When one part of the system doesn't work, this can have a negative impact on the health of the organism.	***Forces predict motion*** The ways in which objects move depends on the forces acting on them. If the forces acting on an object are unbalanced, the object will change its speed, direction or shape. The behavior of objects in motion follow mathematical laws that can be used to make predictions about speed, distance travelled, the time taken and acceleration.	**Ecosystems recycle resources** All of the resources required for life, and produced by living things, are recycled in nature. The chemicals in ecosystems such as water, minerals and carbon are continually cycling through the natural world. Animals are ultimately dependent on green plants (or other producers) as their source of energy.	***Fields produce Forces*** Objects can have an effect on other objects without touching them. In some cases, the effect travels out from the source to the receiver in the form of radiation. In other cases, action at a distance is explained in terms of the existence of a field of influence between objects such as a magnetic, electrical or gravitational field. ***Species show Variation*** All life today is directly descended from a universal common ancestor that was a simple one-celled organism. Over countless generations changes resulting from natural variation within a species lead to the selection of those individuals best suited to survive under certain conditions. Species not able to respond sufficiently to changes in their environment become extinct.	***Electricity transfers energy*** An electrical current is the flow of charge and is a way of transferring energy. The electricity that we rely on for everyday use is generated in power stations and transferred to homes and businesses using the National Grid. Electrical devices use circuits with various components to transfer energy in useful ways ***Earth Systems Interact*** The composition of the Earth and its atmosphere and the processes occurring within them shape the Earth's surface and its climate. Chemicals in the earth have industrial uses and human industry produces chemicals which can affect the earth.	***Radiation transfers energy*** Waves carry energy from one place to another and can also carry information. Electromagnetic waves have various uses, particularly in communications and medicine. Ionising radiation is released from changes to the nuclei of atoms.
	Content	***Tissues and Organs*** The Breathing System Gas Exchange The Digestive System Food Tests	***Speed*** Speed and Acceleration Changing Speeds Distance-Time Graphs Applications of Pressure	***Photosynthesis and Respiration*** Respiration Exercise and Respiration Anaerobic Respiration	***Magnetism*** Magnets Magnetic Fields Electromagnets	***Electric Circuits; Resistance*** Resistance Ohm's Law Measuring Resistance	***Light*** Properties of Light Reflection Refraction

		Diet and Nutrition The Small Intestine Enzymes Digestive Enzymes Amylase Activity Writing Scientific Methods Organ Donation Debate Recreational Drugs The Skeletal and Muscular System ***Acids and Alkalis*** The pH Scale Indicators Indicators Practical Neutralisation Making Salts Acids and metal carbonates Making salts from metal carbonates		Investigating Muscle Fatigue Uses of Anaerobic Respiration Photosynthesis Plant Adaptations Investigating Photosynthesis Non-Photosynthetic Plants Biodomes ***Changing Substances*** Chemical changes Conservation of mass Introduction to Balanced Equations Balancing Equations Oxidation and reduction Core Practical: Burning Magnesium Reactions of Acids Testing for gases	Investigating Electromagnets Earth's Magnetic Field ***Life Diversity*** Variation Inheritance Artificial Selection Natural Selection Evolution Human Impact on Natural Selection	***Earth Systems*** The Rock Cycle The Water Cycle Combustion	
	Assessment	Mastery quiz In class assessment	Mastery quiz ACA	Mastery quiz In class assessment	Mastery quiz ACA	Mastery quiz In class assessment	Mastery quiz ACA
Year 9	Topic	• Growth and Differentiation • Atoms and the Periodic Table	• Acceleration	• Human Interaction • Heating	• Intro to Quantitative Chemistry	• Genetics	• Sound and Waves
	Big Idea	***Cells are Alive*** Cells are alive; all living things are composed of cells, both singly and in multicellular organisms, working together as tissues, organs and organ systems. The exchange of substances between cells and their environment allows the life processes to occur, fueled by the organelles within	***Forces Predict Motion*** The ways in which objects move depends on the forces acting on them. If the forces acting on an object are unbalanced, the object will change its speed, direction or shape. The behavior of objects in motion follow mathematical laws that can be used to make predictions about speed, distance	***Organisms are Interdependent*** Living organisms may form populations of single species, communities of many species and ecosystems, interacting with each other, with the environment and with humans in many ways. Living organisms are interdependent and rely on	***Reactions rearrange matter*** In chemical reactions, atoms are rearranged to form new substances. All chemical reactions involve the rearrangement of atoms. The numbers and types of atoms are the same before and after a chemical	***Characteristics are inherited*** Genetic information in a cell is held in the chemical DNA. All living things have DNA, which is passed from parent to offspring during reproduction. A section of DNA which is responsible for a	***Radiation transfers energy*** Waves carry energy from one place to another and can also carry information. Electromagnetic waves have various uses, particularly in communications and medicine. Ionising radiation is released from changes to the nuclei of atoms.

		performing their function. Differentiated cells allow living things to thrive in a huge variety of habitats. ***Structure determines properties*** Matter is composed of atoms; atoms can link together and arrange in a variety of ways leading to the formation of different structures. This behavior and arrangement of atoms explain the properties of different materials. ***Reactions rearrange matter*** In chemical reactions, atoms are rearranged to form new substances. All chemical reactions involve the rearrangement of atoms. The numbers and types of atoms are the same before and after a chemical reaction. We can represent these reactions using equations.	travelled, the time taken and acceleration.	other organisms in their community to survive and reproduce. ***Energy is Conserved*** Energy cannot be created or destroyed, although it can be transferred from one store to another. Different events can be explained in terms of the energy transfers involved. Energy can be transferred in useful ways for example for transportation, heating and to generate electricity. In these processes, some energy becomes less easy to use.	reaction. We can represent these reactions using equations.	particular protein (or part of the body) is called a gene. Genes determine the development and structure of organisms.	
		Growth and Differentiation Eukaryotic and Prokaryotic Cells Aseptic Technique Growth of Bacteria Microscopes Observing Cells Diffusion Diffusion in Living Things Osmosis Osmosis Investigation Active Transport Cell Division Cancer Stem Cells ***Atoms and the Periodic Table***	***Acceleration*** Scalars and Vectors Resultant Vectors Newton's Third Law Newton's First Law Acceleration Acceleration Investigation Velocity-Time Graphs Acceleration Problems	***Human Interaction*** Biodiversity How Humans affect Biodiversity Global Warming Human Waste Pyramids of Biomass Farming and Biotechnology Food Security ***Heating*** Internal Energy Thermal Transfers Thermal Transfers 2 Specific Heat Capacity Specific Heat Capacity Investigation Specific Latent Heat	***Quantitative Chemistry*** Conservation of Mass Relative Formula Mass Introducing the Mole Mole Calculations Introduction to Concentration Concentration Calculations Soluble Salts Making Soluble Salts	***Genetics*** Sexual and Asexual reproduction Genes and DNA Genetic Engineering Cloning Monohybrid Inheritance Gene Theory	***Sounds and Waves*** Longitudinal and Transverse Wave Properties Sound Waves Seismic Waves Ultrasound

		Atoms Electronic Configuration Isotopes Understanding the Atom The Periodic Table The Noble Gases The Alkali Metals The Halogens The Transition Elements (Chemistry Only)		Pressure in Fluids 1 Pressure In Fluids 2			
	Assessment	Mastery quiz End of topic tests	Mastery quiz ACA	Mastery quiz End of topic tests	Mastery quiz ACA	Mastery quiz End of topic tests	Mastery quiz ACA
Year 10	Topic	• Communicable diseases • Preventing and treating diseases • Chemical calculations • Electrolysis	• Radioactivity • Non-Communicable disease • Wave properties	• Photosynthesis • The human nervous System • Reproduction • Variation and evolution	• Energy changes • Rates and equilibrium • Forces in balance	• Motion • Force and motion • Force and pressure • Space	• Crude oil and fuels • Organic reactions • Polymers
	Key question	What is health? What is a pathogen and how do they cause disease? How does your immune system work? What are the stages involved in developing a new drug? What is meant by relative atomic mass of an element? How to balance a symbol equation What happens in electrolysis and what type of substances can be electrolysed?	What is a radioactive substance? What are the types of radiation given out from a radioactive source? What is the difference between a transverse and longitudinal wave? What is meant by a non-communicable disease?	What are the raw materials needed for photosynthesis? What factors affect the rate of photosynthesis? Why is it important to control your internal environment? Why do we need a nervous system? What makes you different from the rest of your family?	How to distinguish between an exothermic and endothermic reaction? What is meant by activation energy? What is the difference between a vector and scalar? What does Newton's first law state?	How is speed calculated? What is the difference between speed and velocity? How is a motion graph used to determine acceleration? What is meant by pressure and what is the unit for pressure?	What is crude oil made up from? What are the products formed when hydrocarbons burn? How do alkenes react with oxygen in air? How do you write balanced chemical equations for combustion of alcohols? What is meant by additional polymerisation? How do amino acids react together? What is meant by condensation polymerisation?
	Content	Communicable diseases - Health and disease - Pathogens and disease - *Growing bacteria in the lab*	Radioactivity - Atoms and radiation - The discovery of the nucleus	Photosynthesis - Photosynthesis - The rate of photosynthesis - How plants use glucose	Energy changes - Exothermic and endothermic reactions	Motion - Speed and distance-time graphs - Velocity and acceleration	Crude oil and fuels - Hydrocarbons - Fractional distillation of oil - Burning hydrocarbon fuels

		- *Preventing bacterial growth* - Preventing infections - Viral diseases - Bacterial diseases - Diseases caused by fungi and protists - Human defence responses - *More about plant diseases* - *Plant defence responses* Preventing and treating disease - Vaccination - Antibiotics and painkillers - Discovering drugs - Developing drugs - Making monoclonal antibodies - Uses of monoclonal antibodies Chemical calculations - Relative masses and moles - Equations and calculations - From masses to balanced equations - The yield of a chemical reaction - Atom economy - Expressing concentrations - Titrations - Titration calculations - Volume of gases Electrolysis - Introduction to electrolysis - Changes at the electrodes	- Changes in the nucleus - More about alpha beta and gamma - Activity and half life - Nuclear radiation in medicine - Nuclear fission - Nuclear fusion - Nuclear issues Non-communicable diseases - Non-communicable diseases - Cancer - Smoking and the risk of disease - Diet, exercise and disease - Alcohol and other carcinogens Wave properties - The nature of waves - The properties of waves - Reflection and refraction - More about waves - Sound waves - The uses of ultrasound - Seismic waves	- Making the most of photosynthesis The human nervous system - Principles of homeostasis - The structure and function of the nervous system - Reflex actions - The brain - The eye - Common problems of the eye Reproduction - Types of reproduction - Cell division in sexual reproduction - DNA and the genome - Inheritance in action - More about genetics - Inherited disorders - Screening for genetic disorders Variation and evolution - Variation - Evolution by natural selection - Selective breeding - Genetic engineering - Ethics of genetic technologies	- Using energy transfers from reactions - Reaction profiles - Bond energy calculations Rates and equilibrium - Rate of reaction - Collision theory and surface area - The effect of temperature - The effect of concentration and pressure - The effect of catalysts - Reversible reactions - Energy and reversible reactions - Dynamic equilibrium - Altering conditions Forces in balance - Vectors and scalars - Forces between objects - Resultant forces - Centre of mass - The parallelogram of forces - Resolution of forces	- More about velocity time-time graphs - Analysing motion graphs Force and motion - Force and acceleration - Weight and terminal velocity - Forces and braking - Momentum - Forces and elasticity Force and pressure - Pressure and surfaces - Pressure in a liquid at rest - Atmospheric pressure - Upthrust and flotation Space - Formation of the solar system - The life history of a star - Planets, satellites, and orbits - The expanding universe - The beginning and future of the universe	- Cracking hydrocarbons Organic reactions - Reactions of alkenes - Structures of alcohols, carboxylic acids, and esters - Reactions and uses of alcohols - Carboxylic acids and esters Polymers - Additional polymerisation - Condensation polymerisation - Natural polymers - DNA

		- The extraction of aluminium - Electrolysis of aqueous solutions					
	Assessment	End of topic tests	End of topic tests ACA	End of topic tests	End of topic tests ACA	End of topic tests	ACA / Mock exams
Year 11	Topic	• Hormonal coordination • Genetics and evolution	• The earth's resources • Electromagnetism	• Using resources • Wave properties • Electromagnetic waves		Revision and Review	GCSE exams
	Key question	What are the main organs of the endocrine system and what is a hormone? How does insulin control blood glucose concentration? How are fossils formed? What are the basic principles for classification?	What are some examples of natural products that are supplemented or replaced by agricultural and synthetic products? What is the difference between potable water and pure water? What impact does reuse, reduce and recycle have on our environment?	How can iron be protected from rusting? Why are some metals alloys? Why are nitrogen based fertilisers needed to improve crop yields?			
	Content	Hormonal coordination - Principles of hormonal control - The control of blood glucose levels - Treating diabetes - The role of negative feedback - Human reproduction - Hormones and the menstrual cycle - The artificial control of fertility - Infertility treatments Genetics and evolution - Evidence for evolution	The Earth's resources - Finite and renewable resources - Water safe to drink - Treating waste water - Extracting metal ores - Life cycle assessments - Reduce, reuse and recycle Electromagnetism - Magnetic fields - Magnetic fields of electric currents - Electromagnets in devices - The motor effect	Using resources - Rusting - Useful alloys - The properties of polymers - Glass, ceramics, and composites - Making ammonia – the haber process - The economics of the haber process - Making fertilisers in the lab - Making fertilisers in industry Wave properties			

		- Fossils and extinction - More about extinction - Antibiotic resistance bacteria - Classification - New systems of classification	- The generator effect - The alternating-current generator - Transformers - Transformers in action	- The nature of waves - The properties of waves - Reflection and refraction - More about waves - Sound waves - The uses of ultrasound - Seismic waves Electromagnetic waves - The electromagnetic spectrum - Light, infrared, microwaves, and radio waves - Communications - Ultraviolet waves, X-rays, and gamma rays - x-rays in medicine			
	Assessment	End of topic tests	Mock exams	End of topic tests	Mock exams		

Year 12 Physics	• Mechanics and materials	• Electricity	• Waves	• Measurements and their errors	• Particles and radiation	• Revision and review
Assessment		ACA		In class assessment		ACA
Year 13 Physics	• Further mechanics and thermal physics	• Fields and their consequences	• Nuclear physics	• Revision and review	• Revision and review	• A Level Exams
Assessment		Assessment		Mocks		A Level Exams
Year 12 Chemistry	• Periodicity • Atomic structure • Amount of substance • Bonding	• Oxidation reduction and redox equations • Group 2, the alkaline earth metals • Group 7	• Organic chemistry • Alkanes • Halogenoalkanes	• Alkenes • Energetics • Kinetics	• Alcohols • Organic analysis • Chemical equilibria and le Chatlier's principle	• Thermodynamics • Rate equations • Equilibrium constant
Assessment		ACA		In class assessment		ACA
Year 13 Chemistry	• Acids and bases • Optical isomerism • Aldehydes and ketones • Carboxylic acids and derivatives	• Aromatic chemistry • Amines • Polymers • Amino acids proteins and DNA • Electrode potentials	• Transition metals • Reactions of ions • Properties of period 3 • Nuclear magnetic resonance •	• Chromatography • Organic synthesis • Revision and review	• Revision and review	• A Level Exams
Assessment		Assessment		Mocks		A Level Exams

Year 12 Biology	• Biological molecules • Nucleic acids	• Cells • Transport across cell membranes	• Cell recognition and the immune system • Organisms exchange substances with their environment	• Genetic information variation and relationships between organisms	• Biodiversity • Energy transfers in and between organisms	• Revision and review
Assessment		ACA		In class assessment		ACA
Year 13 Biology	• Organisms respond to changes in their internal and external environments	• Genetics populations, evolution and ecosystems	• The control of gene expression	• Revision and review	• Revision and review	• A Level Exams
Assessment		Assessment		Mocks		A Level Exams