

Year 7										
	Autumn Term			Spring Term				Summer Term		
Year 7	Biology 1.1	Chemistry 1.1	Physics 1.1	Biology 1.2	Chemistry 1.2	Physics 1.2	Biology 1.3	Physics 1.3	Chemistry 1.3	Physics 1.4
Big Ideas Covered: Cells are alive; Characteristics are inherited; Organisms are interdependent; Structure determines properties; Forces predict motion; Fields produce forces; Energy is conserved; Electricity transfers energy	Cells Knowledge Content: The structure of a cell; the functions of organelles; using microscopes to see cells; cells specialised to their function Threshold Concepts: All cells share the same fundamental structure which is further characterised by the function required of the cell Link to Prior Learning: This topic builds heavily on students primary knowledge of 'organisms are living objects' Enquiry Question: What fundamental similarities and differences do all organisms share?	Particles Knowledge Content: The particle model; the link between macroscopic properties and microscopic arrangement; particles theory; diffusion and concentration Threshold Concepts: Scientists use models to explain what they cannot see, these models have limitations; the arrangement of particles determines the properties of a material Link to Prior Learning: This topic will link to students ability to distinguish between solids, liquids and gases from KS1/2 Enquiry Question: Why do solids, liquids and gases behave differently?	Contact forces Knowledge Content: What a force is and how we measure them; how to calculate a resultant force; the effect of balanced and unbalanced forces; the effect of friction force; what density is Threshold Concepts: All objects have forces acting on them with the effect of the force depending on the overall resultant force on an object Link to Prior Learning: This topic will build on student understanding of forces as pushes and pulls which can affect the motion or shape of objects Enquiry Question: What effects the motion of objects?	Reproduction Knowledge Content: The human reproductive system; changes during puberty; the menstrual cycle; the process of fertilisation; development from embryo to birth; the reproductive systems of plants; the processes of pollination and seed dispersal Threshold Concepts: All organisms depend on the process of fertilisation in order to reproduce and propagate the species Link to Prior Learning: This topic will develop students' prior knowledge of sexual and asexual reproduction further and build on KS1/2 ideas of gestation and germination Enquiry Question: What happens during the process of fertilisation?	Atoms, Elements & Compounds Knowledge Concepts: All substances are made of atoms; elements are one type of atom and are shown in the periodic table; compounds are formed by chemical reactions and are composed of combinations of atoms; the distinction between molecules and compounds; chemical symbols and formula Threshold Concepts: The smallest particle a substance can be divided into is an atom; atoms can be combined together into molecules, the composition of which can be represented using chemical formula Link to Prior Learning: This topic will build to students' awareness that there are different types of materials, which are made from different substances Enquiry Question: What are different materials made out of?	Gravity Knowledge Concepts: The difference and meaning between mass and weight; the effect of gravity; what is in the solar system; how satellites stay in orbit and their importance Threshold Concepts: Objects within a gravitational force field will experience an attractive force Link to Prior Learning: This topic will build on student awareness of gravity as an attractive force Enquiry Question: Why does the Earth orbit the sun?	Interdependence Knowledge Content: Feeding relationships between organisms in an ecosystem and how to represent these; competition between organisms in an ecosystem; the effect of organisms on the environment; how the environment affects organisms Threshold Concepts: The ability of individuals in a species in reaching reproductive age to propagate the growth of the species largely depends on the relationships and interactions between organisms themselves and with their environments. Link to Prior Learning: This topic will build on student understanding of habitats and that organisms can be grouped into different categories Enquiry Question: How do organisms interact with each other?	Energy Transfers Knowledge Content: What energy is; the law of conservation of energy; the transfer of energy between stores; what happens to wasted energy; efficiency with regards to an energy transfer; the relationship between heat and temperature Threshold Concepts: There is a set amount of energy in the universe which cannot be added to or taken from, this energy can only be transferred between stores to allow phenomena to occur Link to Prior Learning: This topic will be new taught material to students although they will have ideas about energy from their everyday experience Enquiry Question: What does energy allow us to do?	Mixtures Knowledge Content: What purity means to a scientist; how to describe mixtures and solutions; how to obtain pure substances through physical processes; the role of Rf values, melting and boiling points in identifying substances Threshold Concepts: Purity is defined as one type of particle; mixtures can be easily separated; we need to separate some mixtures to identify and utilise component parts Link to Prior Learning: This topic will build on students' awareness of how to separate materials depending on their state of matter Enquiry Question: How can we obtain a pure substance?	Electric Circuits: Currents and Potential difference Knowledge Content: How to use circuit symbols and interpret circuit diagrams; the difference in series and parallel circuits; what an electric current is and how it behaves in series and parallel circuits; the relationship between potential difference and energy; how potential difference behaves in series and parallel circuits Threshold Concepts: Electric current is the movement of charge and is used as a form of energy transfer between stores Link to Prior Learning: This topic will build on students' basic knowledge of electrical cells and components Enquiry Question: How does electricity travel in a circuit?
	Curriculum Skills	Use models to communicate ideas; carry out practical work using appropriate apparatus; record and display observations of scientific phenomena	Use models to communicate ideas; appreciate the limitations of scientific models; record and display data appropriately; recognise the importance of developing theories and models over time	Use theories to develop hypotheses; plan experiments to explore hypotheses, data and phenomena; record and display data appropriately; give explanations for data; use appropriate SI units	Use appropriate terminology to explain scientific processes; display and record information appropriately	Use models to communicate ideas; use correct terminology and definitions; make and analyse observations of scientific phenomena	Plan experiments to explore hypotheses; plan experiments using appropriate apparatus to explore hypotheses; record and display data appropriately; recognise the importance of developing theories and models over time	Recognise trends and patterns in data and give explanation for these; perform statistical analysis; communicate scientific ideas clearly through writing and oracy	Use models to communicate ideas; translate data between different forms; recognise trends and patterns in data and give explanation for these	Use models to communicate ideas; appreciate the limitations of scientific models; carry out experiments to explore phenomena; record and display data appropriately; evaluate the application of science in everyday events

Year 8

Year 8										
Autumn Term				Spring Term				Summer Term		
Year 8	Biology 2.1	Chemistry 2.1	Physics 2.1	Biology 2.2	Chemistry 2.2	Physics 2.2	Biology 2.3	Physics 2.3	Chemistry 2.3	Physics 2.4
Big Ideas Covered: Bodies are systems; Ecosystems recycle resources; species show variation; Reactions rearrange matter; Earth systems interact; Forces predict motion; Fields predict forces; Electricity transfers energy; Radiation transfers energy	Tissues & Organs Knowledge Content: The hierarchy of cells, tissues, organs and systems; the skeletal and muscular systems; the digestive system; the process of digestion and function of enzymes; the process of gas exchange in human; the process of gas exchange in plants; the effect of drugs on the body Threshold Concepts: The structure of internal systems are dependent from the function which the system carries out. Link to Prior Learning: This topic builds on students' awareness of digestive and circulatory systems Enquiry Question: How is the body organised?	Acids & Alkalis Knowledge Content: The properties of acids and alkalis; pH and the pH scale; the use of indicators; the reactions of acids with alkalis; the production of salts; basic introduction to ionisation Threshold Concepts: A substances' pH value determines if it is acidic or alkaline; acids and alkalis react together to produce neutral substances Link to Prior Learning: This topic will be new taught content to students however will utilise ideas about particles, atoms, elements and compounds taught previously in KS3 Enquiry Question: What are the differences between acids and alkalis?	Movement & Pressure Knowledge Content: What speed measures; how to calculate speed; representing motion on a distance-time graph; calculating pressure and work done Threshold Concepts: We can use measurements to quantify scientific phenomena; forces play a central role in the motion of objects Link to Prior Learning: This topic leads to students previous KS3 knowledge of forces and their effect on the motion of objects Enquiry Question: How can we work out how fast an object is moving?	Respiration & Photosynthesis Knowledge Content: The process and purpose of respiration; representing and linking biological process as reactions; the differences between aerobic and anaerobic respiration; the process and purpose of photosynthesis; the importance of photosynthesis; the adaptations of leaves to allow for photosynthesis; Threshold Concepts: Respiration and photosynthesis are energy transfer reactions within organisms, photosynthesis is the organic process by which organisms utilise energy from the sun Link to Prior Learning: This topic will build on students' basic knowledge of plants and what they need to survive. Enquiry Question: How do plants produce their own food?	Changing Substances Knowledge Content: What happens during a chemical reaction; the distinction between chemical and physical reactions; the law of conservation of mass; chemical equations; the reactions of metals and oxygen; the reactions of metal and acids Threshold Concepts: Chemical reactions produce new substances due to the rearrangement of atoms and changing compositions of particles Link to Prior Learning: This topic will develop students' understanding of particles, elements and compounds taught previously in KS3 Enquiry Question: How can we tell a chemical reaction has occurred?	Magnetism Knowledge Content: What a magnetic force is; the effects of similar and dissimilar magnetic fields; representing magnetic fields; how to induce magnetism within an object and effect the strength of the magnet produced; the uses of electromagnetism Threshold Concepts: Magnetic forces are produced by magnetic fields which we can manipulate to obtain the desired effect. Link to Prior Learning: This topic links to the idea of forces producing fields which can affect the motion, shape and position of objects Enquiry Question: How do fields interact with each other?	Life Diversity Knowledge Content: How genetics and environment lead to variations in a species; variation in species can lead to individuals being more or less successful; variations lead to a species becoming adapted to their environments; the theory of evolution & natural selection Threshold Concepts: Variation between organisms has allowed for evolution of species through natural selections into the range of biodiversity we have today. Link to Prior Learning: This topic build on student's understanding that changes in organisms occur over a long period of time Enquiry Question: How have all living organisms developed from one common ancestor?	Electric Circuits: Resistance Knowledge Content: What the effect of resistance on an electric current is; what causes the resistance in an electric circuit; how we can measure resistance; Ohm's law Threshold Concepts: Resistance is the opposition of electric current, resistance can be used to control component behaviour in a circuit. Link to prior learning: This topic builds on students' understanding of electric current from previous KS3 teaching Enquiry Question: What are the factors affecting the flow of electric current?	Earth Systems Knowledge Content: The structure of the earth; the rock cycle; materials making up the Earth's atmosphere and environment are recycled through natural processes; the water cycle; the composition of the Earth's atmosphere; the impact of fuel combustion on the atmosphere, environment and human life Threshold Concepts: Human actions can impact negatively with devastating effect to the natural environment; there is a set amount of matter in the universe that is recycled through various systems Link to Prior Learning: This topic will draw students' prior learning of respiration and photosynthesis from biology topics and previous KS3 knowledge of reactions and changing substances. Enquiry Question: How have natural processes structured the Earth as we currently know it?	Light Knowledge Content: How light waves allow us to see; the representation of light through ray diagrams; why we experience different colours; the refraction of light; the reflection of light Threshold Concepts: Waves are a form of energy transfer; the properties of waves determine how we experience them Link to prior learning: This topic will build on students' awareness of light being considered a wave and luminosity as a property of objects Enquiry Question: How does light interact with different materials?
	Curriculum Skills Communicate scientific ideas clearly through writing and oracy; use theory to develop hypotheses; carry out experiments to explore phenomena; record and display data appropriately	Record and display data appropriately; use theory to develop hypotheses; plan experiments to explore hypotheses and phenomena; record and display data appropriately; evaluate the application of science in every day events	Use calculations to obtain quantifiable values; use and convert between prefixes and appropriate SI units; use appropriate numbers of significant figures	Use models to communicate ideas; record and display data appropriately; recognise trends and patterns in data and give explanations for these; evaluate the application of science in everyday events	Use models to communicate ideas; use theory to develop hypotheses; use appropriate apparatus to explore phenomena; make and analyse observations of scientific phenomena; record and develop data appropriately	Use models to communicate ideas; translate data between different forms; use theory to develop hypotheses; plan experiments to explore hypotheses and phenomena; record and display data appropriately; evaluate the application of science in everyday events	Recognise trends and patterns in data and give explanation for these; perform statistical analysis; communicate scientific ideas clearly through writing and oracy	Use models to communicate ideas; use appropriate SI units; use theory to develop hypotheses; carry out experiments to explore phenomena; record and display data appropriately; recognise the importance of developing theories and models over time	Use models to communicate ideas; recognise the importance of developing theories and models over time; record and display data appropriately; recognise trends and patterns in data and give explanations for these	Use models to communicate ideas; plan experiments to explore phenomena; record and display data appropriately; recognise trends and patterns in data and give explanations for these

Year 9

Year 9									
Autumn Term			Spring Term			Summer Term			
Year 9	Biology 3.1	Chemistry 3.1	Physics 3.1	Biology 3.2	Chemistry 3.2	Physics 3.2	Biology 3.3	Physics 3.3	Physics 3.4
<p>Big Ideas Covered:</p> <p>Cells are alive; Characteristics are inherited; Organisms are interdependent; Structure determines properties; Reactions rearrange matter; Earth systems interact; Forces predict motion; Energy is conserved; Electricity transfers energy; Radiation transfers energy</p>	<p>Growth and differentiation</p> <p>Knowledge Content: Eukaryotic and prokaryotic cells; transport of substances in cells; cell division through mitosis; why cells differentiate; the uses and ethical issues surrounding stem cells</p> <p>Threshold Concepts: The movement of substance occurs over concentration gradients; The differentiation of cells is key to being able to perform specific functions</p> <p>Link to Prior Learning: This topic will revisit and deepen knowledge of cells from early KS3</p> <p>Enquiry Question: How are cells structures to function efficiently?</p>	<p>The Periodic Table</p> <p>Knowledge Content: The structure of the atom; the development of the model of the atom; sub-atomic particles; the formation of ions as redox reactions; patterns within group 1 & 7 reactivity; the distinction between group 1,&3 metals and transition metals; the uses of transition elements</p> <p>Threshold Concepts: The balance of force and interaction between charges of sub-atomic particles determines the behaviour and reactivity of elements in the periodic table</p> <p>Link to Prior Learning: This topic will link to student's understanding of elements and patterns in reactivity</p> <p>Enquiry Question: What is an atom made out of?</p>	<p>Acceleration</p> <p>Knowledge Content: What a vector is; Newton's first and third law; representing motion in a velocity-time graph; what acceleration is, how acceleration can be calculated, measured and represented</p> <p>Threshold concepts: Forces produce motion of objects; we can measure the movement of objects to deduce information about the forces acting on them</p> <p>Link to prior learning: This topic brings together students' learning from previous KS3 topics focused on forces</p> <p>Enquiry Question: How does an object's speed change over time?</p>	<p>Human Interaction</p> <p>Knowledge Content: The importance of biodiversity; the impact of humans on the planet; what global warming is and how it occurs; how we can use technology and science to manipulate natural processes and create advances in farming and sustainability</p> <p>Threshold Concepts: The interactions of humans with the planet's natural processes impacts the planet's environment and consequently the fate and behaviour of other organisms</p> <p>Link to Prior Learning: This topic will build on student's understanding of environmental change, from both KS2/3 knowledge, and interdependence of organisms within an ecosystem, covered earlier in KS3.</p> <p>Enquiry Question: How can human driven technology impact on the environment and those that depend on it?</p>	<p>Measuring Matter</p> <p>Knowledge Content: The law of conservation of mass applies to all chemical reactions; chemical amounts are measured in moles; balanced chemical equations show molar ratios or reactants and products; atom economy measures how efficient a reaction is; the amount of chemical matter present in solution is measured as the concentration; chemical equations can be used to calculate volumes of gaseous reactants and products</p> <p>Threshold Concepts: Matter cannot be created or destroyed; macroscale measurements can be used to determine microscale amounts</p> <p>Link to Prior Learning: This topic will link to students' knowledge of reactions and particles established through KS3 topics</p> <p>Enquiry Question: How can we prove the law of conservation of mass?</p>	<p>Heating</p> <p>Knowledge Content: Internal energy of a system; the direction and nature of heat transfer; measuring insulators and conductors; specific heat capacity; latent heat; pressure in gases; pressure in liquids;</p> <p>Threshold concepts: Heat is a form of energy transfer between thermal stores; the amount of energy in a closed system is constant</p> <p>Link to prior learning: This topic builds on students' knowledge of energy stores, transfers and revisits the law of conservation of energy</p> <p>Enquiry Question: What are the factors affecting heat transfer?</p>	<p>Genetics</p> <p>Knowledge Content: The structure and function of DNA; the relationship between chromosomes, genes and DNA; the process and ethical debate surrounding genetic engineering; how inherited characteristics are dependent upon the allele form of the inherited gene; how genetic screening can be used to determine potential health disorders</p> <p>Threshold Concepts: Inherited variation within a species is dependent upon an organisms genetic code, this variation can allow for some individuals to be more successful than others in a given environment</p> <p>Link to Prior Learning: This topic will give further explanation to variation within a species and extend students' knowledge of reproduction, both topics visited earlier in KS3.</p> <p>Enquiry Question: What information does DNA carry?</p>	<p>Home electricity</p> <p>Knowledge Content: Static electricity; the domestic use of AC supply; Wiring of a plug and related electrical hazards; how to measure the power used and the energy transferred to a device; the transfer of energy through the national grid</p> <p>Threshold concepts: The movement of electric current is a form of energy transfer; our modern lifestyles are dependent on energy supplied by electricity; electric current can be manipulated to reduce energy loss or resistance during transfer</p> <p>Link to prior learning: This topic will expand students' knowledge of electrical circuits taught previously in KS3, it will also provide links to explore previous energy topics</p> <p>Enquiry Question: How do we use electricity to benefit modern lifestyles?</p>	<p>Sound and Waves</p> <p>Knowledge Content: Characteristics of longitudinal and transverse waves; The production and behaviour of sound waves in different mediums; ultrasound; how to find the speed of a wave; refraction and reflection of waves; detection using waves</p> <p>Threshold concepts: The propagation of waves transfers energy; the refraction and reflection of waves allows us to detect information about a medium or environment</p> <p>Link to prior learning: This topic will build upon student knowledge of light waves and their behaviour</p> <p>Enquiry Question: How can we utilise the behaviour of sound waves?</p>
	<p>Curriculum Skills</p>	<p>Use models to communicate ideas; carry out practical work using appropriate apparatus; record and display observations of scientific phenomena; evaluate the application of science in everyday events; evaluate the risks of science in a social context</p>	<p>Use models to communicate ideas; recognise the importance of developing theories and models over time; use theory to develop hypotheses; recognise trends and patterns in data and give explanation for these; evaluate the application of science in everyday events</p>	<p>Use calculations to obtain quantifiable values; use and convert between prefixes and appropriate SI units; use appropriate numbers of significant figures; use theory to develop hypotheses; record and display data appropriately; evaluate methods used in collecting data</p>	<p>Communicate scientific ideas clearly through writing; recognise the importance of developing theories and models over time; draw conclusions from given data; evaluate the application of science in everyday events; evaluate the risks of science in a social context</p>	<p>Use calculations to obtain quantifiable values; use appropriate SI units; use appropriate numbers of significant figures; perform statistical analysis; evaluate methods and suggest improvements</p>	<p>Use calculations to obtain quantifiable values; use and convert between prefixes and appropriate SI units; use models to communicate ideas; plan experiments to explore phenomena; record and display data appropriately; recognise trends and patterns in data and give explanations for these</p>	<p>Use models to communicate ideas; evaluate the application of science in everyday events; evaluate the risks of science in a social context; recognise the importance of developing models over time; evaluate the limitations of methods which are used in developing models</p>	<p>Use calculations to obtain quantifiable values; evaluate the application of science in everyday events; evaluate the risks of science application in a social context; recognise trends and patterns in data and give explanation for these</p>

Year 10									
Autumn Term			Spring Term			Summer Term			
Year 10	Biology 4.1	Chemistry 4.1	Physics 4.1	Biology 4.2	Chemistry 4.2	Physics 4.2	Physics 4.3	Biology 4.3	Physics 4.4
Big Ideas Covered: Bodies are systems; Ecosystems recycle resources; species show variation; Structure determines properties; Reactions rearrange matter; Earth systems interact; Forces predict motion; Energy is conserved; Electricity transfers energy; Radiation transfers energy	<p>Organ Systems</p> <p>Knowledge Content: The heart and circulatory system; the importance of heart function and health; the nervous system and reflex responses; the importance of good health; non-communicable diseases; communicable diseases; the body's defence against disease; vaccination and drug development; the importance and uses of monoclonal antibodies</p> <p>Threshold Concepts: The body is a set of complex systems which are structured to carry out particular functions; disease can take many forms and affect these systems causing harm to the human body</p> <p>Links to Prior Learning: This topic links to students' KS3 knowledge of organ systems, bodily functions and scientific processes such as respiration.</p> <p>Enquiry Question: How are organ systems structured in order to function to achieve the desired outcome?</p>	<p>Structure and Bonding</p> <p>Knowledge Content: The three types of bonding within materials as covalent, ionic and metallic; the process of electron sharing and consequent covalent bonding; the process of ion formation and consequent bonding; the process of positive metal ion formation and delocalisation of electrons and consequent metallic bonding; giant covalent structures; polymers; energy associated with bonds and intermolecular forces;</p> <p>Threshold Concepts: The properties of materials depend upon the structures of particles at an atomic level; the interaction between oppositely charged particles is responsible for the bonding together of atoms and particles</p> <p>Links to Prior Learning: This topic will rely on students' knowledge of the particle model and ability to classify materials</p> <p>Enquiry Question: How does structure at an atomic level influence the properties of a material</p>	<p>Movement</p> <p>Knowledge Content: Moments and gears; Newton's second law; measuring acceleration; calculating stopping distances; factors affecting stopping distances; calculating momentum; the law of conservation of momentum</p> <p>Threshold Concepts: Properties of motion such as acceleration can be measured and quantified in order to explore about the forces acting on objects</p> <p>Links to Prior Learning: This topic links to knowledge of forces and motion taught in KS3 and will build directly on prior knowledge of acceleration</p> <p>Enquiry Question: What can we deduce about forces from the motion of objects?</p>	<p>Plants and Materials Cycling</p> <p>Knowledge Content: How the structure and design of leaves allow plants to carry out photosynthesis; how materials move through plants; the recycling of materials (carbon, water, nitrogen) through an ecosystem; disease in plants; plant defences against disease</p> <p>Threshold Concepts: The organ structures inside a plant allow plants to carry out essential life processes effectively; there is a set amount of materials available for life on Earth to use and these materials are changed as they move through cycles due to biological and physical processes</p> <p>Links to Prior Learning: This topic will link to students' knowledge of photosynthesis and plant nutrition which were covered in KS3</p> <p>Enquiry Question: How are materials transported through plant systems?</p>	<p>Controlling Reactions</p> <p>Knowledge Content: Energy changes in reactions; Le Chatelier's principle: reversible reactions and how to manipulate the outcome of these; factors which affect the rate of reactions; measuring and calculating the rate of reaction; the Haber process and production of fertilisers; the process of electrolysis; predicting the products of electrolysis; representing electrolysis as a redox reaction</p> <p>Threshold Concepts: The rate and success of a reaction can be influenced by the controlling of external conditions; the transfer of electrons between ions and atoms is integral to the process of redox reactions</p> <p>Links to Prior Learning: This topic will link to students' KS3 knowledge of reactions and KS4 knowledge of electron transfer</p> <p>Enquiry Question: How do external factors affect the rate of reactions?</p>	<p>Energy Conservation</p> <p>Knowledge Content: Energy stores and the transfer of energy between these; how to quantify the amount of energy in an energy store and calculate energy transferred; the law of conservation of energy; measuring the specific heat capacity of a material; available resources of energy</p> <p>Threshold Concepts: Energy is transferred between stores when actions occur</p> <p>Links to Prior Learning: This topic will build on students prior understanding of energy stores, efficiency and heat transfer covered in KS3</p> <p>Enquiry Question: How can we measure the transfer of energy between stores?</p>	<p>Electric Circuits and Energy</p> <p>Knowledge Content: Calculating charge flow; the relationship between resistance and current; components which rely on variable resistance; the applications of thermistors and LDRs</p> <p>Threshold Concepts: Resistance is the opposition to charge flow (current) and can determine the amount of energy transferred through a circuit</p> <p>Links to Prior Learning: This topic will build on student's knowledge of electric circuits, current, potential difference and resistance taught during KS3</p> <p>Enquiry Question: How can we use the effects of resistance?</p>	<p>Evolution</p> <p>Knowledge Content: The reproduction and mutation of bacteria leading to bacterial resistance; the difficulties surrounding the treatment of antibiotic resistance; classification of living organisms and the binomial naming system; the theory of evolution from a common ancestor through natural selection; the use of fossils as proof of evolution; the arguments against evolution</p> <p>Threshold Concepts: All living things originated from one common ancestor; natural selection allowed some organisms to flourish in environments and pass their characteristics to offspring leading to variation among organisms</p> <p>Links to Prior Learning: This topic will build on students' awareness of evolution, natural selection and DNA mutation established in KS3</p> <p>Enquiry Question: What evidence do we have for the theory of evolution?</p>	<p>Radioactivity</p> <p>Knowledge Content: Isotopes and unstable nuclei; the process of radioactive decay; the nature and distinction between types of nuclear radiation; the random nature of radioactive decay and the use of a half-life; the hazards associated with nuclear radiation; background radiation; nuclear fission and nuclear fusion</p> <p>Threshold Concepts: Radioactive decay occurs in order to stabilise a nucleus and in doing so creates new substances; nuclear radiation is present in different forms which each present their properties</p> <p>Links to Prior Learning: This topic will consist of new information for students but will build on their understanding of atomic structure from KS3 chemistry topics</p> <p>Enquiry Question: What makes something radioactive?</p>
	<p>Curriculum Skills</p>	<p>Explain clearly scientific processes; evaluate the ability of a structure to achieve a desired function; evaluate the application of science in everyday events; evaluate ethical arguments surrounding the application of science</p>	<p>Use models to communicate ideas; communicate scientific ideas clearly through writing and oracy; recognise trends and patterns in data and give explanations for these; evaluate the application of science in everyday events</p>	<p>Use calculations to obtain quantifiable values; use and convert between prefixes and appropriate SI units; use appropriate numbers of significant figures; record and display data appropriately; recognise trends and patterns in data and give explanation for these</p>	<p>Use models to clearly communicate ideas; recognise trends and patterns in data and give explanations for these; evaluate the ability of a structure to achieve a desired function</p>	<p>Use models to communicate ideas; carry out practical work using appropriate apparatus; use appropriate terminology to explain scientific processes; display and record information appropriately; communicate scientific ideas clearly through writing and oracy</p>	<p>Use calculations to obtain quantifiable values; use and convert between prefixes and appropriate SI units; use appropriate numbers of significant figures; use models to communicate ideas; evaluate the application of science in everyday life</p>	<p>Use calculations to obtain quantifiable values; use and convert between prefixes and appropriate SI units; use appropriate numbers of significant figures; use theory to develop hypotheses; recognise the importance of developing models over time; explain clearly scientific processes; perform statistical analysis</p>	<p>Communicate scientific ideas clearly through writing and oracy; use theory to develop hypotheses; recognise the importance of developing models over time; explain clearly scientific processes; perform statistical analysis</p>

Year 11

Autumn Term

Spring Term

Summer Term

Year 11	Biology 5.1	Chemistry 5.1	Physics 5.1	Chemistry 5.2	Biology 5.2	Chemistry 5.3	Physics 5.2	
Big Ideas Covered: Bodies are systems; Characteristics are inherited; Structure determines properties; Earth systems interact; Fields predict forces; Radiation transfers energy	<p>Feedback and control</p> <p>Knowledge Content: The purpose and of homeostasis; how the body affects change through automatic control systems; the release and control of hormones in the endocrine system; the effect of certain hormones on the body; the role of hormones in plant production and growth; how to control blood glucose levels; the control of body temperature; the control of water and nitrogen levels in the body; the structure and functions of the brain and eye</p> <p>Threshold Concepts: Organisms are made of multiple systems which need to be regulated in order to allow complex biochemical processes to occur</p> <p>Links to Prior Learning: This topic will build on students' understanding of the body as a complex multitude of systems, students will be familiar with the idea of hormones as chemical messengers and the structure-function relationship of organs and systems from KS3/4</p> <p>Enquiry Question: How do systems in the body communicate?</p>	<p>Carbon Chemistry</p> <p>Knowledge Content: The allotropes of carbon materials and their properties; nanoparticles; the production of hydrocarbons; alkanes and alkenes; the combustion of hydrocarbons; fractional distillation and cracking; the reactions of functional groups; polymerisations reactions; DNA as a polymer</p> <p>Threshold concepts: Carbon compounds are essential structures in biological life processes; the structure of carbon compounds at a microscopic level determines the behaviour of the compound or material and its ultimate application</p> <p>Links to Prior Learning: This topic will build on students' knowledge of structure and bonding and draws on knowledge of biological processes such as photosynthesis and anaerobic respiration</p> <p>Enquiry question: What role does carbon play in life processes and resource recycling?</p>	<p>EM Radiation</p> <p>Knowledge Content: EM waves as examples of transverse waves, regions of the EM spectrum; the transmission, absorption, reflection and refraction of waves; the use of EM waves in communication; the effects of EM waves on the body; practical applications of EM waves; manipulating light using lenses; the behaviour of visible light, black body radiation and temperature</p> <p>Threshold Concepts: EM waves occurs across a spectrum and the behaviour and consequent applications of EM waves vary according to the positioning on the EM spectrum</p> <p>Links to Prior Learning: This topic will build on students' knowledge of wave behaviour and the applications of waves in everyday life, covered throughout KS3</p> <p>Enquiry Question: What makes an EM wave suitable for its application?</p>	<p>Analytical Chemistry</p> <p>Knowledge Content: Pure substances, mixtures and formulations; the process of chromatography and calculating Rf values; gas tests; flame tests; the use of GCMS</p> <p>Threshold concepts: The properties of compounds within a substance allows for identification of unknown substances via both physical and chemical processes</p> <p>Links to prior learning: This topic links to students' knowledge of mixtures and solutions building on KS3 teaching</p> <p>Enquiry question: How can we identify a substance using analytical chemistry?</p>	<p>Controlling Reproduction</p> <p>Knowledge Content: The role of hormones in puberty and the reproductive cycle; the effect of testosterone during the process of reproduction; the hormones and patterns involved in the menstrual cycle; the contraceptive methods available to control fertility; the use of hormones to treat infertility; the physical and emotional effects of fertility treatment</p> <p>Threshold Concepts: Hormones control the body's actions and can be manipulated in order to enhance fertility</p> <p>Links to Prior Learning: Students' will be familiar with hormonal responses from previous KS4 topics, they will also know the processes or reproduction and fertilisation from KS3 knowledge.</p> <p>Enquiry Question: How can reproduction be suppressed or enhanced through hormonal treatment?</p>	<p>The atmosphere</p> <p>Knowledge Content: The composition of the atmosphere; processes leading to changes in the early atmosphere to the present day; the presence and impact of greenhouse gases; human activity and its impact on the environment; the importance of peer review; the effects of climate change; the combustion of fossil fuels; the processes inside fuel cells</p> <p>Threshold Concepts: The composition of the earth's atmosphere has been established over millions of years; human activity is leading to rapid changes in the global atmosphere with potentially devastating effects</p> <p>Links to Prior Learning: This topic brings together students' knowledge of compounds and reactions, the reactions of carbon chemistry and Earth's systems and resources covered throughout KS3/4</p> <p>Enquiry Question: What is the impact of modern human life on our planet?</p>	<p>Force Fields</p> <p>Knowledge Content: Magnetic materials and magnetic force fields; observing and representing magnetic force fields; interactions at magnetic poles; how to produce an electromagnet; factors affecting the strength of an electromagnet; Fleming's left hand rule; the motor effect; the solar system; the lifecycle of a star; red-shift as evidence of the big bang theory; the expansion of the galaxy</p> <p>Threshold Concepts: Force fields are areas within which bodies experience forces which alter their position, shape or motion</p> <p>Links to Prior Learning: This topic will build on student familiarity of the behaviour of magnets and the idea of forces acting on objects.</p> <p>Enquiry Question: How do objects behave in different force fields?</p>	
	<p>Curriculum Skills</p>	<p>Communicate scientific ideas clearly through writing and oracy; use models to communicate ideas; recognise trends and patterns in data and give explanations; evaluate the application of science in everyday events</p>	<p>Recognise trends and patterns in data and give explanations for these; evaluate the application of science in everyday usage; communicate scientific ideas clearly through writing and oracy</p>	<p>Use models to communicate ideas; communicate scientific ideas clearly through writing and oracy; recognise trends and patterns in data and give explanation for these; evaluate the application of science in everyday events; evaluate the risks of science application in a social context</p>	<p>Carry out practical work using appropriate apparatus; recognise trends and patterns in data and give explanation for these; evaluate the application of science in everyday usage</p>	<p>Use models to clearly communicate ideas; recognise trends and patterns in data and give explanations for these; communicate scientific ideas clearly through writing and oracy; evaluate ethical arguments surrounding the application of science</p>	<p>Recognise trends and patterns in data and give explanations for these; evaluate the application of science in everyday usage</p>	<p>Use calculations to obtain quantifiable values; use and convert between prefixes and appropriate SI units; use models to communicate ideas; plan experiments using appropriate apparatus to explore hypotheses; recognise trends and patterns in data and give explanations for these; evaluate the application of science in everyday events;</p>

Narration of Big Ideas Over Time

A student's journey in science at Ark Blake Academy begins with an introduction to the key principles of each Big Idea at KS3. These Big Ideas are studied in further, intricate, detail as students move through KS4. The learning journey culminates in KS5 where students will develop a sophisticated understanding of both essential and abstract scientific phenomena allowing them to move forward as burgeoning experts in their chosen scientific field.

During years 7 & 8, pupils will be taught the foundational knowledge and concepts for each Big Idea, introducing pupils to key scientific principles. Alongside this, pupils will develop the essential skills needed to communicate scientifically, this includes; the ability to write in a scientific manner, the ability to analyse and present data to draw conclusions and an appreciation of the scientific method. Throughout years 9, 10 & 11, students will not only build on their foundational knowledge to study each discipline in detail but also explore how this knowledge is applied in the world around us. For example, students will explore how scientists have applied ideas such as the manipulation of reaction conditions to increase desired outcomes, to the management of body's system using medicine to ensure human health.

Biology	Cells are alive	In KS3, pupil's scientific learning journey starts as we explore what cells are and the structures inside them which carry out the essential life processes. In KS4, student's learning builds to focus on the specialised nature of cells which allow organisms to thrive in a variety of situations and environments, how cells function and reproduce as a unit, and finally, the opportunities available to modern science when considering the manipulation of cells as a medical intervention.
	Bodies are systems	In KS3, pupils will first learn of organ systems journey when discussing the human body, through KS3 our understanding of systems deepens as we consider the systems in other living organisms such as plants and how these systems allow the organisms to survive. In KS4, students will study the in-depth nature of how organ, messenger and hormonal systems protect and control the body, they will be able to describe the purpose of these systems and explain how changes in these systems will affect an organism's ability to function.
	Organisms are interdependent	In KS3, pupils will explore how living organisms depend upon each other for survival and reproduction to ensure a variety of life on our planet, pupils will be able to understand the impact of an individual or species on a community or ecosystem. In KS4, students will build on this idea to analyse the impact of human life on the natural systems around us and how these systems have responded to technological and human advances.
	Ecosystems recycle resources	In KS3, pupils will establish an understanding of the substances needed and produced by the essential life processes of plants and how these substances interact with environmental systems on a global scale. As students enter KS4 they will revisit and deepen their understanding of how the planet provides resources which organisms use, process and return in a different form, students will learn how changing the ratios of these resources impacts on the delicate global systems needed to keep our planet functioning safely.
	Characteristics are inherited	In KS3, pupils will learn how the processes of sexual and asexual reproduction allow for individual organisms to pass on their genetic material and promote the future of their species. Students will return to this idea at the end of KS3 as they explore what genetic material is and how it encodes the information needed for organisms to function. In KS4, students will learn how scientific advances have allowed up to manipulate reproductive processes through our understanding of the body's hormonal systems.
	Species show variation	In KS3, pupils will discover the vital nature of variation within the living organisms that populate our planet, by learning about adaptations and selective breeding pupils will develop an appreciation for the different forms of life needed to sustain our various ecosystems and communities world-wide. In KS4, students will study how different organisms are classified and how our knowledge of life on the planet has been extended since the acceptance of the theory of evolution.
Chemistry	Structure determines properties	In KS3, pupils understanding of structure starts with an establishment of the particle model and how particle arrangement explains the properties and of the materials around us. Pupil's deepen their understanding of structure as they are introduced to chemical elements and atoms alongside the concepts of purity and mixtures. In KS4, students will explore how the bonding between particles at a microscale level determines the macroscopic behaviour of materials that we experience in everyday life.
	Reactions rearrange matter	In KS3, pupils will be introduced to the idea of reactions as they study the changes between acids and alkalis and compare chemical physical and chemical changes. Pupils will extend their knowledge of reactions in KS3 as they learn of common reaction types which allow chemists to classify and predict the new materials produced during a chemical reaction. In KS4, students will be able to apply their knowledge of chemical changes to real-life situations as they explore how to control and manipulate a reaction to obtain a certain result or product.
	Earth systems interact	In KS3, pupils will establish an appreciation of the essential nature of the Earth's systems and how the Earth provides us with the resources we need for survival through the water, carbon and rock cycles. In KS4, students will study the reciprocal nature of the relationship between humans and the Earth and be able to analyse the impact of human interference on these systems. To conclude this big idea, students will learn of new technologies which are being applied to reduce the impact of human interaction on the Earth's systems.
Physics	Forces predict motion	In KS3, pupils will extend their knowledge of forces as pushes and pulls in a system as they explore the idea of contact and non-contact forces. Pupils will study how the magnitude and directions of forces at play will affect the motion of an object and the work needed to complete an action. In KS4, students will analyse the motion of objects in detail as they study acceleration and Newton's Laws. Finally, students will apply their understanding of forces to explain how machines work and the impact of forces on motion in our everyday lives.
	Fields produce forces	In KS3, pupils will establish the idea of non-contact forces producing a force field which can affect the position and motion of objects in a system, studying the solar system and magnetic systems as an example of force-fields in action. In KS4, students will develop their understanding further as they study the complex nature of interacting force-fields, resulting in the motor effect, and the impact of force-fields on the solar systems and space physics.
	Energy is conserved	In KS3, pupils will be introduced to the concept of energy as an essential requirement for actions to happen. Pupils will learn of the ways energy can be transferred between different stores in order to allow actions to happen and how to reduce the waste of energy between transfers. In KS4, students will build on the idea of heat as a method of energy transfers as they explore how the specific latent heat and specific heat capacities of materials affect the rate of energy transfer.
	Electricity transfers energy	In KS3, pupils will be introduced to the fundamental ideas of electricity including current and potential difference, students will master these ideas as they explore how these differ in series and parallel circuits. Pupils will build on this knowledge as they study the concept of resistance in circuits and Ohm's Law. In KS4, students will apply their knowledge of electricity as a form of energy transfer within the home and throughout national systems, allowing us to power many of the needed facets of our everyday lives.
	Radiation transfers energy	In KS3, pupils will be introduced to radiation as energy transfer in the form of waves, pupils will study the fundamentals of wave knowledge alongside the behaviour of light phenomena including reflection and refraction, and sound phenomena including ultrasound and echoes. In KS4, students will learn how energy can be released via radioactive decay and the processes of nuclear fusion and fission. Finally, students will study the uses and benefits of electromagnetic radiation, and the associated hazards to humans when used in everyday life.