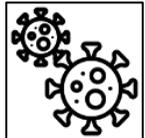




Science Curriculum Map

<p>St. Cuthbert's Curriculum Vision</p> 	<p>The curriculum at St Cuthbert's provides ambitious educational opportunities for all members of our community. The curriculum equips our students with the knowledge, skills and personal characteristics they need to flourish as literate, articulate, global citizens, who fulfil the Catholic Mission to bring about the Common Good.</p>
<p>Science Curriculum Vision</p> 	<p>To establish clear learning routines – through regular retrieval practice– in order to develop a sound knowledge base of a broad range of key Scientific concepts which will be built on throughout the curriculum. A high-quality science education provides the foundations for understanding the world through the specific disciplines of biology, chemistry and physics. Science has changed our lives and is vital to the world's future prosperity, and all pupils should be taught essential aspects of the knowledge, methods, processes and uses of science. Through building up a body of key foundational knowledge and concepts, pupils will be encouraged to recognise the power of rational explanation and develop a sense of excitement and curiosity about natural phenomena. They will be encouraged to understand how science can be used to explain what is occurring, predict how things will behave, analyse causes, encourage creativity and problem solve.</p>

Curriculum Icons Key

Catholic Mission	Careers (CEIAG)	COVID Catch-up	Cultural Capital	Enrichment Opportunities	Preparing for life in modern Britain	Literacy and communication	Skills for Life
							



	Science 'at a glance'		
	AUTUMN	SPRING	SUMMER
YEAR 7	<p>How Science Works The Human Body Acids and Alkali's Forces and Motion</p>	<p>Nutrition and Digestion Particle Theory Light and Sound</p>	<p>Ecology Earth and Atmosphere Space</p>
YEAR 8	<p>How Science Works States of Matter The Periodic Table Reproduction Forces- Stretching and Squashing</p>	<p>Atoms, Elements and Compounds Electricity Gas Exchange and Respiration</p>	<p>Energy Chemical Reactions Magnetism</p>
YEAR 9	<p>Genetics Materials Pressure and Moments Cells and Control</p>	<p>States of Matter and Separating Techniques Motion Plant Structures and Functions Atomic Structure</p>	<p>Forces Health, Disease and Development of Medicines Groups in the Periodic Table and Energy Changes</p>
YEAR 10	<p>Conservation of Energy Genes Bonding Waves</p>	<p>Cell Division and Nervous System Acids and Alkali's Radioactivity <u>Astronomy</u> <u>*Separate Science only</u></p>	<p>Forces Doing Work and Their Effects Calculations, Electrolysis and Equilibria Ecosystems and Material Cycles <u>Separate Chemistry 1</u></p>
YEAR 11	<p>Exchange and Transport in Animals Organic Chemistry and Earth's Atmosphere Electricity and Circuits Magnets and Electromagnetic Induction</p>	<p>Homeostasis Particle Model/Stretching <u>Separate Chemistry 2</u></p>	<p>Revision Programme</p>

Y7 Science

YEAR 7		AUTUMN	SPRING	SUMMER
Year 7	Theme	 How Science Works, The Human Body, Acids and Alkalis, Forces and motion    	 Nutrition and Digestion, Particle Theory, Light and Sound    	 Ecology, Earth and Atmosphere, Space    
	Knowledge	<p><u>How Science works</u> Safety Equipment Observations and gas tests Practical planning hypothesis Methods and diagrams Results and graphs Conclusion and evaluation</p> <p><u>Human Body</u> Introductory lesson Living organisms Skeletal system Muscles Organs Plant and animal cells Microscopes x2 Unicellular and multicellular organisms Adapted cells</p>	<p><u>Nutrition and digestion</u> Introductory lesson Diet and food groups Testing foods Daily allowances - link to roles Unbalanced diet (diseases) Digestive system (recap organs) Gums to bums demonstration Biological catalysts</p> <p><u>Particle theory</u> Introductory lesson Solids liquids gases Changes of state (salol) Mixtures and pure substances Filtration Evaporation Chromatography Distillation</p>	<p><u>Ecology</u> Introductory lesson Habitats and adaptation Food chain Food web Plant reproduction (pollination, seed dispersal and food security) Bioaccumulation Photosynthesis Photosynthesis equation (gas tests) Leaf adaptation Testing a leaf for starch Stoma and microscopes</p> <p><u>Earth and Atmosphere</u> Introductory lesson Composition and structure of the Earth Types of rock The rock cycle Fossils The atmosphere</p>



YEAR 7		AUTUMN	SPRING	SUMMER
		<p><u>Acids and Alkalis</u> Introductory lesson pH scale Acids and alkalis Making an indicator Acids and metals - gas tests Neutralisation</p> <p><u>Forces and Motion</u> Introductory lesson Forces Force diagrams Describing motion Speed = distance/time Distance- time graphs Distance/time investigation Balanced forces</p>	<p><u>Light and Sound</u> Introductory lesson Wave structure Transverse - longitudinal Structure of the ear and audible range Sound circus Light waves Absorption, refraction, reflection Pinhole cameras The eye and convex lenses Colours of light - mixing and prisms Ray boxes Visible, UV, IR dangers and uses</p>	<p>Renewable and non-renewable resources Recycling Carbon cycle Climate change</p> <p><u>Space</u> Introductory lesson Solar system Mass, weight and gravity The moon Day and night and the night sky Seasons The sun and a light year Models of the universe</p>
Skills	<p>Apply my scientific knowledge from other investigations to plan a similar investigation. Write a conclusion using the evidence collected and my knowledge and understanding of science. Plan (with guidance) investigations, identifying key factors that need to be considered. Present my data clearly and concisely using graphs with lines of best fit.</p>			
Rationale	<p>Overall rational for the curriculum:</p> <p>To build on key concepts taught at KS1 and KS2 and allow misconceptions to be addressed. Introduction topic - allows pupils to learn about the role of a Scientist, how we carry out investigations, what equipment, skills, techniques are required in Science. Topics are selected in order to build on prior knowledge and foster interest and wonder in Science through practical elements. All topics selected in year 7 are building on prior knowledge and extending to incorporate new ideas and content. There is an introductory lesson at the start of every topic- this is a theme that runs throughout their journey through KS3 and 4.</p>			



YEAR 7	AUTUMN	SPRING	SUMMER
	<p>The introductory lesson will have links to prior knowledge, literacy links to the topic, job roles linked to the topic, where this learning fits in with future topics, any project/literacy based homework and links to the Science library. Year 7/8 Science club will be available for enrichment opportunities.</p>		
	<p>Why? How Science works The aim of the working scientifically topic is to give all pupils the opportunity to practice these skills, which they will use repeatedly across their full school career. It also gives teachers the opportunity to gauge the depth and breadth of Science studied at primary school.</p> <p>We teach a spiral curriculum each term throughout the full five years. Staff will pause at natural transitions between Biology, Chemistry and Physics. Pupils have a different book for each discipline. The purpose of this is to continuously recap/revisit and practice so that learning is interleaved and spaced.</p> <p>Human body – Pupils study this topic here to gain greater depth of knowledge of their prior learning listed in the KS2 curriculum, but also the breadth of study increases as they undertake learning of cells and key components ready for future study.</p>	<p>Why? Nutrition and digestion – the purpose of teaching this topic at this stage is to link our understanding of the key concepts from the human body in term one, to the wider roles that involve the different systems that link together to make the body function.</p> <p>Particle theory – again this is a fundamental topic that needs to be understood, practiced and concepts grasped in order to progress throughout the course.</p> <p>Light and Sound – key concepts and knowledge will again be taught and allow pupils the opportunity to practice their practical and investigative skills.</p> <p>Links to prior learning: Nutrition and digestion – Pupils will have studied the following at KS2 - identify and name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood.</p>	<p>Why? Ecology – During the summer term the study of ecology will give us the opportunity to learn from outside the classroom.</p> <p>Earth and Atmosphere – Pupils will have some understanding of the structure of the Earth from prior learning in Science and Geography, however the emphasis is on building and deepening knowledge and understanding once again. Whilst also developing life skills and reflecting on our own effect on the environment.</p> <p>Space – We place this topic towards the end of the year as it is a really good opportunity for independent enquiry, pupils have great fun exploring this topic.</p> <p>Links to prior learning: Ecology – The topic is covered by the following statements at KS2 - Describe how living things are classified into broad groups according to common observable characteristics and based on similarities</p>



YEAR 7	AUTUMN	SPRING	SUMMER
	<p>Acids and Alkalis - The purpose of placing this topic in the first term is to introduce new learning, skills and concepts, whilst also giving pupils the opportunity to practice the How Science works skills that they have established from the start of the term.</p> <p>Forces - The purpose of studying the forces content at this stage is to build on prior learning, extend and deepen knowledge in preparation for further study in subsequent years. Graph skills developed in the How Science works topic will be further practiced and developed. Links with maths have been made so that we as a department sequence how we teach this concept as we do it first.</p> <p>Links to prior learning: How Science works Pupils should have some experience from KS2 as detailed in the national curriculum - During years 5 and 6, pupils should be taught to use the following practical scientific methods, processes and skills through the teaching of the programme of study content:</p>	<p>Recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function.</p> <p>Describe the ways in which nutrients and water are transported within animals, including humans.</p> <p>Particle theory – Pupils have the following experience from KS2 - Compare and group together everyday materials on the basis of their properties, including their hardness, solubility, transparency, conductivity (electrical and thermal), and response to magnets.</p> <p>Know that some materials will dissolve in liquid to form a solution, and describe how to recover a substance from a solution.</p> <p>Use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating.</p> <p>Give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic.</p> <p>Demonstrate that dissolving, mixing and changes of state are reversible changes.</p>	<p>and differences, including micro-organisms, plants and animals.</p> <p>Give reasons for classifying plants and animals based on specific characteristics.</p> <p>Study at KS3 goes far beyond this and links plants, plant structure and function, photosynthesis in order to start making those links about why things such as seasons has an effect on plant growth, which starts to broaden the how, what and why of scientific enquiry.</p> <p>Earth and Atmosphere – We study this content here to again build on prior learning at KS2 - compare and group together different kinds of rocks on the basis of their appearance and simple physical properties.</p> <p>Describe in simple terms how fossils are formed when things that have lived are trapped within rock.</p> <p>Recognise that soils are made from rocks and organic matter.</p> <p>Space – Pupils have the following prior knowledge from KS2- Describe the movement of the Earth and other planets relative to the sun in the solar system.</p> <p>Describe the movement of the moon relative to the Earth.</p>



YEAR 7	AUTUMN	SPRING	SUMMER
	<p>Planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary.</p> <p>Taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate.</p> <p>Recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs.</p> <p>Using test results to make predictions to set up further comparative and fair tests.</p> <p>Reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of and a degree of trust in results, in oral and written forms such as displays and other presentations.</p> <p>Human body – the first biology topic to be studied is a fundamental topic that starts with linking prior learning that should have been covered - Describe the changes as humans develop to old age.</p> <p>Notice that animals, including humans, have offspring which grow into adults.</p>	<p>Explain that some changes result in the formation of new materials, and that this kind of change is not usually reversible, including changes associated with burning and the action of acid on bicarbonate of soda. From this, pupils should have a good grasp regarding separating techniques, they may have limited experience of particle model, it is important however that the application, strength and suitability of models are discussed and pupils are able to articulate the key fundamentals in order for progression. It once again also gives the opportunity to establish prior learning and builds up knowledge from the individual class' starting point.</p> <p>Light and Sound – Pupils will have the following knowledge from KS2 - Recognise that light appears to travel in straight lines.</p> <p>Use the idea that light travels in straight lines to explain that objects are seen because they give out or reflect light into the eye.</p> <p>Explain that we see things because light travels from light sources to our eyes or</p>	<p>Describe the sun, Earth and moon as approximately spherical bodies.</p> <p>Use the idea of the Earth's rotation to explain day and night and the apparent movement of the sun across the sky.</p> <p>Links to future learning:</p> <p>Ecology – Plants are studied again in year 9 when we do plant structures and functions, and also ecology in year 10.</p> <p>Earth and Atmosphere – We study this content again in year 11 when we do Earth's atmosphere.</p> <p>Space – The key fundamentals are taught here in preparation for pupils who go onto study the separate sciences.</p>



YEAR 7	AUTUMN	SPRING	SUMMER
	<p>Find out about and describe the basic needs of animals, including humans, for survival (water, food and air). Describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene. Identify and name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood. Recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function. Describe the ways in which nutrients and water are transported within animals, including humans.</p> <p>Acids and Alkalis - The acids and alkali topic is a new concept that isn't taught at KS2 in any great depth.</p> <p>Forces - Forces is another fundamental element to the curriculum. Pupils will have had the following experience of the following content at KS2- Forces - Pupils should be taught to: Explain that unsupported objects fall towards the Earth because of the force of</p>	<p>from light sources to objects and then to our eyes. Use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them. Identify how sounds are made, associating some of them with something vibrating. Recognise that vibrations from sounds travel through a medium to the ear. Find patterns between the pitch of a sound and features of the object that produced it. Find patterns between the volume of a sound and the strength of the vibrations that produced it. Recognise that sounds get fainter as the distance from the sound source increases. The purpose of studying this content here is to deepen and extend knowledge beyond what has been taught previously and prepare students to broaden knowledge ready for later study.</p> <p>Links to future learning: Nutrition and digestion – The purpose of studying enzymes at this stage is to deepen and extend knowledge beyond KS2 and prepare pupils for later learning</p>	

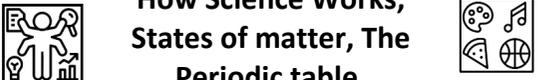
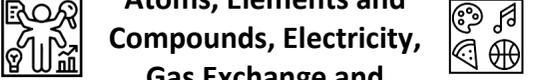
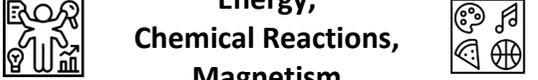


YEAR 7	AUTUMN	SPRING	SUMMER
	<p>gravity acting between the Earth and the falling object. Identify the effects of air resistance, water resistance and friction, that act between moving surfaces. Recognise that some mechanisms including levers, pulleys and gears allow a smaller force to have a greater effect.</p> <p>Links to future learning: How Science works – the foundations of practical equipment, planning, investigation, reporting, concluding and evaluating starts off our curriculum. The how Science works fundamental skills appear all throughout our curriculum in every year.</p> <p>Human body – Studying this topic now, will take into account prior knowledge and experiences but extend pupils knowledge and understanding by grasping the key fundamentals such as cells which comes up repeatedly throughout the KS3/KS4 curriculum, as well as being able to use, set up and observe cells through a microscope.</p>	<p>as this content comes up again in ,cells and control.</p> <p>Particle theory – This topic comes up again in year 8 and 9 when doing states of matter.</p> <p>Light and Sound – This content is studied again in year 10 when we look at the waves topic.</p>	



YEAR 7		AUTUMN	SPRING	SUMMER
		<p>Acids and Alkalis - This content is revisited in the acids and alkali's topic taught in year 10.</p> <p>Forces - Forces is a topic that is learnt throughout the curriculum on a regular basis, it appears in year 8 when pupils study stretching and squashing, year 9 in motion and again when pupils study forces.</p>		

Y8 Science

YEAR 8		AUTUMN	SPRING	SUMMER
Year 8	Theme	 <p>How Science Works, States of matter, The Periodic table, Reproduction, Forces – Stretching and Squashing</p>   	 <p>Atoms, Elements and Compounds, Electricity, Gas Exchange and Respiration</p>   	 <p>Energy, Chemical Reactions, Magnetism</p>   
	Knowledge	<p>How Science works</p> <p>Safety Equipment</p>  <p>States of Matter Introductory lesson Solids, liquids and gases and change of state recap Particle arrangement in solids, liquids and gases recap and internal energy Physical and chemical changes Density Diffusion Brownian motion</p> <p>The Periodic Table Introductory lesson Physical and chemical properties of elements Periodic table introduction and Mendeleev</p>	<p>Atoms Elements and Compounds Introductory lesson Dalton atomic model Differences between atoms, elements and compounds Chemical symbols and formulae Conservation of mass Changes of state and chemical reactions Endothermic and exothermic reactions</p> <p>Electricity Introductory lesson Circuits and components Current and potential difference Series and parallel circuits Resistance Static electricity Electricity in the home Power in Watts and appliance ratings Energy transfers of electrical appliances Domestic fuel bills, use and costs</p>	<p>Energy Introductory lesson Conduction Convection Radiation Insulators Conservation of energy</p> <p>Chemical reactions Introductory lesson Chemical reactions and the arrangement of atoms Word equations Symbol equations Combustion Thermal decomposition Oxidation</p> <p>Magnetism Introductory lesson Magnets</p>



YEAR 8	AUTUMN	SPRING	SUMMER
	<p>Metals and non-metals and their properties Periods and Groups Metal and non-metal oxides and acidity</p> <p><u>Reproduction</u> Introductory lesson Male and Female reproductive organs Puberty Reproduction and gametes Birth and Pregnancy Menstrual cycle Personal hygiene Plant reproduction and seed dispersal recap and investigation</p> <p><u>Forces - stretching and squashing</u> Introductory lesson Forces recap from year 7 Stretching and squashing Hooke's Law investigation Spring deformation</p>	<p><u>Gas Exchange and Respiration</u> Introductory lesson The lungs Gas exchange in humans and plants How exercise, asthma and smoking affects gas exchange Breathing Aerobic respiration Anaerobic respiration Fermentation Health Alcohol and its effects Recreational drugs and their effects</p>	<p>Earth's magnetism Magnetic fields and plotting compasses Electromagnets Magnetic effect of a current</p>
Skills	<p>Apply my scientific knowledge from other investigations to plan a similar investigation. Write a conclusion using the evidence collected and my knowledge and understanding of science. Interpret my data and begin to explain these trends using my scientific knowledge and understanding. Plan (with guidance) investigations, identifying key factors that need to be considered. Present my data clearly and concisely using graphs with lines of best fit. Apply my knowledge and understanding to a range of contexts including unfamiliar situations</p>		



YEAR 8		AUTUMN	SPRING	SUMMER
Rationale	<p>Why? How Science works – We start the year off by revisiting the key skills and concepts as a refresher so that pupils are given the opportunity to revisit, recap and practice the skills developed in year 7.</p> <p>States of Matter - we study this content here to build upon our prior learning from the particle model in year 7. By teaching these concepts here we allow links to be developed between prior knowledge and new knowledge ready for further depth of study in subsequent years.</p> <p>The periodic table – now that particles and states of matter have been covered, we full circle our learning to underpin the idea of elements and where we find them in the periodic table. We look at the history behind the periodic table and how Scientists’ work together and peer review in order to come up with concepts.</p> <p>Reproduction – We study reproduction in year 8 rather than year 7 to give our pupils the opportunity to mature that bit more, whilst also respecting individuals’ opinions and wishes. We teach the Science behind</p>	<p>Why? Atoms Elements and Compounds – We study this content here as it is another fundamental that comes up time and again in the curriculum.</p> <p>Electricity – electricity is taught here to build on the knowledge and understanding developed from atomic structure and the understanding of what an electron is and how this also links to the key concepts of electricity in physics.</p> <p>Gas Exchange and Respiration – We study this concept here as we are adding another system to our understanding of biology.</p> <p>Links to prior learning: Atoms Elements and Compounds – We have the foundations relating to the periodic table and what it contains, but during this learning we really deepen our knowledge, skills and understanding by looking at what elements are made of, what happens when we have more than one element, how is a mixture different to a compound and so on. The purpose of studying this topic here is that we have sound prior knowledge and can now make</p>	<p>Why? Energy – this is a fundamental topic that builds upon prior learning of things such as the particle model and atoms, whilst also introducing new learning regarding how energy is transferred.</p> <p>Chemical reactions – this topic is the next sub sequential step of working through the key chemistry fundamentals.</p> <p>Magnetism – The aim of studying this content here is to build on those prior links, whilst exploring the more demanding concepts of the magnetic effect of a current, which will be revisited in the curriculum later.</p> <p>Links to prior learning: Energy – None of this is explicitly taught at KS2 so new learning will be practiced and retained through recall and recap for the remainder of the year and beyond.</p> <p>Chemical reactions – Pupils have studied the periodic table, atoms, elements and compounds and now need to begin to apply their knowledge and skills to extend their understanding in terms of chemical reactions and how and why they occur.</p>	



YEAR 8	AUTUMN	SPRING	SUMMER
	<p>reproduction as set out in the KS3 national curriculum.</p> <p>Forces - stretching and squashing- Building on our forces and motion concepts taught in year 7 we now look at how forces affect objects through investigations and determining conclusions. Whilst also introducing more higher-level concepts such as Hooke's Law.</p> <p>Links to prior learning: States of Matter - Pupils will have experience of the following from KS2 - Compare and group materials together, according to whether they are solids, liquids or gases. Observe that some materials change state when they are heated or cooled, and measure or research the temperature at which this happens in degrees Celsius (°C). Identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature.</p> <p>The periodic table – Pupils will have limited prior knowledge from previous study, which is why we introduce it at this</p>	<p>links in terms of scientific understanding between, particles, elements, atoms and so on.</p> <p>Electricity – It also links back to prior KS2 learning - Associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit. Compare and give reasons for variations in how components function, including the brightness of bulbs, the loudness of buzzers and the on/off position of switches. Use recognised symbols when representing a simple circuit in a diagram. Pupils should have a good understanding of components in a circuit but new knowledge and practice will extend into different types of circuits, how we calculate resistance and link our learning to what happens in our homes to make it relevant and stick.</p> <p>Gas Exchange and Respiration – We have covered the digestive, reproductive and skeletal system so far. This layered approach rather than teaching all systems in one go will help pupils to distinguish between the different systems as it</p>	<p>Magnetism – pupils will have some understanding of magnets and magnetism from KS2 - Compare how things move on different surfaces. Notice that some forces need contact between 2 objects, but magnetic forces can act at a distance. Observe how magnets attract or repel each other and attract some materials and not others. Compare and group together a variety of everyday materials on the basis of whether they are attracted to a magnet, and identify some magnetic materials. Describe magnets as having 2 poles Predict whether 2 magnets will attract or repel each other, depending on which poles are facing.</p> <p>Links to future learning: Energy – We will revisit this learning in year 10 when we do conservation of energy. Chemical reactions – This will be a skill that will be revisited consistently through the remaining curriculum.</p> <p>Magnetism – This learning is revisited in magnets and electromagnetic induction in year 11.</p>

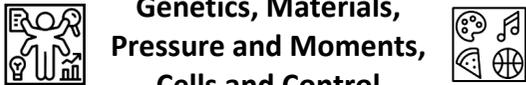
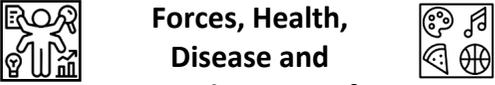


YEAR 8	AUTUMN	SPRING	SUMMER
	<p>point in the curriculum so that new learning can be practiced and revisited in subsequent weeks, terms and years.</p> <p>Reproduction – The content builds on knowledge of the human body and systems taught in year 7 whilst also building the foundations for further study in year 9 and at KS4. Prior learning from this topic includes- Describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird. Describe the life process of reproduction in some plants and animals.</p> <p>Forces - We do a recap of year 7 learning just to revisit and reemphasise the key concepts already embedded and allow pupils to practice what they know.</p> <p>Links to future learning: States of Matter - This content is studied again in year 9 when we do states of matter and separating techniques</p> <p>The periodic table – The placement of this topic is crucial for the atoms, elements and compounds topic that comes next term, and atoms, elements and</p>	<p>reduces confusion by having them separated out. Pupils tend to have a fair few misconceptions regarding respiration and breathing, these will be addressed during this topic. Prior learning at KS2 includes - Identify and name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood.</p> <p>Recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function.</p> <p>Describe the ways in which nutrients and water are transported within animals, including humans.</p> <p>Links to future learning: Atoms Elements and Compounds – This fundamental process will again be revisited, built on and extended throughout the full program of study.</p> <p>Electricity – Electricity is further studied in year 11 when we do electricity and circuits.</p> <p>Gas Exchange and Respiration – This content is studied further in exchange and transport in animals.</p>	



YEAR 8		AUTUMN	SPRING	SUMMER
		<p>compounds in year 9. Groups in year 9, and bonding in year 10.</p> <p>Reproduction – This topic is revisited in year 11 when we do homeostasis.</p> <p>Forces - We study some of this content again in year 11 when we do particle model/stretching.</p>		

Y9 Science

YEAR 9		AUTUMN	SPRING	SUMMER
Year 9	Theme	 <p>Genetics, Materials, Pressure and Moments, Cells and Control</p> 	 <p>States of Matter and Separating Techniques, Motion, Plant Structures and Functions, Atomic Structure</p> 	 <p>Forces, Health, Disease and Development of Medicines, Groups in The Periodic Table and Energy Changes</p> 
	Knowledge	<p><u>Genetics</u> Introductory lesson Inheritance Genes, Chromosomes and DNA Development of DNA model and Scientists involved Variation Continuous and discontinuous variation Natural selection Extinction Biodiversity and the gene pool</p> <p><u>Materials</u> Introductory lesson Reactivity series Reduction of metal oxides Properties of ceramics, polymers and composite materials</p>	<p><u>States of matter and separating techniques</u> Introductory lesson States of matter Mixtures Filtration and crystallisation Chromatography Distillation Distillation investigation Drinking water</p> <p><u>Motion</u> Introductory lesson Vectors and scalars Distance time graphs Acceleration Velocity/time graphs</p>	<p><u>Forces</u> Resultant forces Newton's 1st law Mass and weight Newton's 2nd law Acceleration investigation Newton's 3rd law Momentum Stopping distances Crash hazards <i>Stopping distance calculations</i></p> <p><u>Health, disease and development of medicines</u> Introductory lesson Health and disease Non communicable diseases Cardiovascular disease Pathogens</p>



YEAR 9		AUTUMN	SPRING	SUMMER
		<p><u>Pressure and Moments</u> Introductory lesson Pressure Pressure in liquids Calculating pressure Moments Levers</p> <p><u>Cells and control</u> Introductory lesson Microscopes Plant and animal cells Microscopes investigation- preparing and viewing slides Specialised Cells Bacteria cells Enzymes and nutrition <i>Investigation - food tests</i> Enzyme and how they work Enzymes and conditions Investigating pH and enzymes Transporting substances in living things Osmosis investigation</p>	<p><u>Plant structures and functions</u> Introductory lesson Photosynthesis <i>leaf structure</i> Limiting factors Photosynthesis investigation Osmosis and active transport Transporting substances in plants <i>Plant adaptations</i> <i>Plant hormones</i> <i>Plant defences</i></p> <p><u>Atomic Structure</u> Introductory lesson Structure of an atom Atomic number and mass number Isotopes Elements and the periodic table Atomic number and the periodic table Electronic configuration and the periodic table</p>	<p>Spreading pathogens <i>Virus life cycles</i> Physical & Chemical barriers The immune system <i>herd immunity</i> Antibiotics <i>Aseptic technique- core prac</i> <i>Monoclonal antibodies</i></p> <p><u>Groups in the periodic table and energy changes</u> Introductory lesson Group 1 Group 7 Halogen reactivity Group 0 Rates of reaction Factors affecting reaction rates Investigating reaction rates Catalysts Exo/endothermic Energy changes in reactions</p>
	Note	<i>Content highlighted in bold italic is used to assess pupils' suitability to access separate science curriculum. This is predominantly aimed at T band set 1 and 2.</i>		



YEAR 9		AUTUMN	SPRING	SUMMER
	Skills	Decide on the observations and measurements that need to be taken and the degree of accuracy that is required. Set up and use a range of scientific apparatus with precision and skill. Plan (with guidance) investigations, identifying key factors that need to be considered. Present my data clearly and concisely using graphs with lines of best fit. Produce (unaided) precise plans for my investigations. Evaluate my investigations and produce structured reports.		
	Rationale	<p>Why? Genetics – we study genetics at the start of year 9 as it is one of the more demanding aspects of KS3. The content builds upon knowledge of cells and cell structure but focussed on the role of DNA and inheritance.</p> <p>Links to prior learning: Genetics – Students will have the following prior knowledge from KS2 - Recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago. Recognise that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents. Identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution. This should have been studied in year 6, so staff will be aware</p>	<p>Why? Pupils are now transitioning between KS3/KS4 crossover. Key concepts taught at KS3 that occur in KS4 will be revisited to strengthen and extend knowledge, skills and understanding.</p> <p>Links to prior learning: States of matter and separating techniques – this is sequenced here as a revisit and extension of the states of matter content taught in year 8.</p> <p>Motion – this aspect of the curriculum is taught here as a recap and extension of the year 7 forces and motion topic taught in year 7.</p> <p>Plant structures and functions – this aspect of the curriculum is taught here as a recap and extension of the year 7 ecology topic taught in year 7.</p>	<p>Why? Pupils are now transitioning between KS3/KS4 crossover. Key concepts taught at KS3 that occur in KS4 will be revisited to strengthen and extend knowledge, skills and understanding.</p> <p>Links to prior learning: Forces - this aspect of the curriculum is taught here as a recap and extension of the year 7 forces and motion topic and year 8 forces stretching and squashing topic.</p> <p>Health, disease and development of medicines - this aspect of the curriculum is taught here as a recap and extension of the year 7 human body topic taught in year 7, reproduction in year 8 and cells and control in autumn term year 9.</p> <p>Groups in the periodic table and energy changes - this aspect of the curriculum is taught here as a recap and extension of</p>



YEAR 9	AUTUMN	SPRING	SUMMER
	<p>that key concepts and fundamentals that are needed to be understood for progression at KS4 will need to be consistently recalled and retrieved throughout the subsequent terms.</p> <p>Links to future learning: Genetics – This learning will be studied again in year 10 when we go over the genes topic.</p> <p>Why? Materials – This again holds some more difficult concepts that will be used subsequently throughout the remaining curriculum.</p> <p>Links to prior learning: Materials – Pupils will have the following prior knowledge from KS2 - Compare and group together everyday materials on the basis of their properties, including their hardness, solubility, transparency, conductivity (electrical and thermal), and response to magnets> Know that some materials will dissolve in liquid to form a solution, and describe how to recover a substance from a solution.</p>	<p>Atomic Structure - this aspect of the curriculum is taught here as a recap and extension of the year8 topics- periodic table and atoms, elements and compounds.</p> <p>Links to future learning: States of matter and separating techniques – This content will constantly be reviewed and revisited throughout the remaining curriculum as key knowledge and skills are embedded through practice and retrieval. The aim is to challenge and extend our pupils so that they succeed and enjoy what they learn.</p> <p>Motion – Key fundamentals are recovered and more science specific language is introduced in order to upskill our pupils and prepare them for the demands of GCSE, we are building foundational knowledge and skills.</p> <p>Plant structures and functions – Key fundamentals are recovered and more science specific language is introduced in order to upskill our pupils.</p> <p>Atomic Structure - Key fundamentals are recovered and more science specific</p>	<p>the year 8 periodic table and atoms, elements and compounds topics. As well as the materials topic from the autumn term of year 9.</p> <p>Links to future learning: Forces - Key fundamentals are recovered and more science specific language and knowledge is introduced in order to upskill our pupils and prepare them for the demands of GCSE. This topic also extends on the motion fundamentals taught in the previous term.</p> <p>Health, disease and development of medicines - Key fundamentals are recovered and more science specific language and knowledge is introduced in order to upskill our pupils.</p> <p>Groups in the periodic table and energy changes - Key fundamentals are recovered and more science specific language and knowledge is introduced in order to upskill our pupils.</p>



YEAR 9	AUTUMN	SPRING	SUMMER
	<p>Use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating. Give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic. Demonstrate that dissolving, mixing and changes of state are reversible changes Explain that some changes result in the formation of new materials, and that this kind of change is not usually reversible, including changes associated with burning and the action of acid on bicarbonate of soda. Pupils will use their prior learning in year 8 from the atoms, elements and compounds topic to extend and consolidate their understanding of the new content learned.</p> <p>Links to future learning: Materials – This new learning will be revisited in year 10 when we study calculations, electrolysis and equilibria, and year 11 separate Science when we study <i>Separate chemistry 2</i>.</p>	<p>language and knowledge is introduced in order to upskill our pupils.</p>	

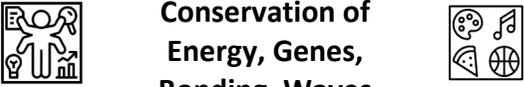
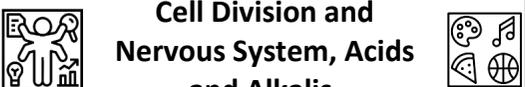


YEAR 9	AUTUMN	SPRING	SUMMER
	<p>Links to prior learning: Pressure and Moments – Pupils will use their prior learning from forces in year 7 and 8 to extend and build upon their knowledge to encompass the key concepts and practicalities relating to pressure and moments.</p> <p>Why? Pressure and Moments – Pupils are working on the more difficult aspects here in order to prepare them for the longer term progression through the curriculum.</p> <p>Links to future learning: Pressure and Moments – Students will recap this learning when we go over the particle Model/stretching topic in year 11.</p> <p>Why? Cells and control - pupils are working on their consolidation of the key concepts from year 7 and 8 in order to progress to the next level of the many layers of knowledge that are needed.</p> <p>Links to prior learning: Cells and control - Pupils have the basics and fundamentals which they have developed over the past two years within</p>		



YEAR 9		AUTUMN	SPRING	SUMMER
		<p>our curriculum, that aim here is (human body and nutrition) and extend their knowledge further by introducing more difficult concepts that can be regularly practiced during the subsequent curriculum.</p> <p>Links to future learning: Cells and control - Pupils will revisit this learning in year 9 when they study health and disease and genetics in year 10.</p>		

Y10 Science

YEAR 10		AUTUMN	SPRING	SUMMER
Year 10	Theme	 <p>Conservation of Energy, Genes, Bonding, Waves</p> 	 <p>Cell Division and Nervous System, Acids and Alkalis, Radioactivity, Astronomy</p> 	 <p>Forces Doing Work and Their Effects, Calculations, Electrolysis and Equilibria, <i>Separate Chemistry 1</i>, Ecosystems</p> 
	Knowledge	<p><u>Conservation of energy</u> Introductory lesson Energy stores and transfers Efficiency Keeping warm Stored energies Non-renewable resources Renewable resources</p> <p><u>Genes</u> Introductory lesson <i>Sexual and asexual reproduction</i> Meiosis DNA DNA extraction <i>Protein synthesis</i> <i>Mendell</i> Alleles Inheritance <i>Multiple missing alleles</i></p>	<p><u>Cell Division and nervous system</u> Introductory lesson Mitosis Growth in animals Growth in plants Stem cells The nervous system Neurotransmission <i>The brain</i> <i>The eye</i></p> <p><u>Acids and Alkalis</u> Introductory lesson Acids, alkalis and indicators Looking at acids Bases and salts CORE PRAC copper sulfate Alkalis and balancing equations CORE PRAC neutralisation Alkalis and neutralisation</p>	<p><u>Forces doing work and their effects</u> Introductory lesson Work and power Objects affecting each other Vector diagrams <i>Rotational forces</i></p> <p><u>Calculations, electrolysis and equilibria</u> Introductory lesson Masses and empirical formulae Conservation of mass Moles Electrolysis Products of electrolysis Core Prac - electrolysis <i>Electroplating</i> Reactivity Oxidation and Reduction Ores Oxidation & reduction</p>

	<p>Gene mutation Variation Evolution Darwin Classification Tissue culture Breeds and varieties Genes in agriculture and medicine and GM Fertilisers and biological control</p> <p>Bonding Introductory lesson Ionic bonds Ionic lattices Properties of ionic compounds Covalent bonds Molecular compounds Allotropes of carbon Properties of metals Bonding models</p> <p><i>Rates of reaction</i> <i>Factors affecting reaction rates</i> <i>CORE PRAC - reaction rates</i> <i>Catalysts</i> <i>Exo/endothemic</i> <i>Energy changes in reactions</i></p> <p>Waves Introductory lesson</p>	<p>Acids, metals and carbonates Solubility</p> <p>Radioactivity Introductory lesson Atomic models Inside atoms Electrons and orbits Background radiation Types of radiation Radioactive decay Half-life Dangers of radioactivity Contamination and irradiation Radioactivity in medicine Nuclear energy Nuclear fission Nuclear fusion</p> <p>Astronomy Introductory lesson Our solar system Red shift Origins of the universe Stars</p>	<p>Life cycle assessment Dynamic equilibrium Factors affecting dynamic equilibrium Fertilisers and the Haber process</p> <p>Separate chemistry 1 Introductory lesson Yields Concentration and titration calculations Acid-alkali titration Molar volume of gases Transition metals and uses Corrosion and rust prevention Alloys and uses Fuel cells</p> <p>Ecosystems and material cycles Introductory lesson Ecosystems and energy transfer Abiotic factors & communities CORE PRAC quadrats Biotic factors & communities Biodiversity eutrophication and humans Preserving biodiversity parasitism and mutualism Food security The water cycle The carbon cycle The nitrogen cycle Assessing pollution Decay</p>
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	<p>Describing waves Wave speeds <i>calculate depth or distance from time and wave velocity</i> CORE PRAC waves Refraction <i>ray diagrams and diffuse/specular reflection</i> <i>Waves crossing boundaries</i> <i>Ears and hearing</i> <i>Ultra and infrasound</i> <i>Colour and lenses</i> Electromagnetic waves CORE PRAC refraction EM spectrum Uses and dangers of the EM Spectrum <i>Radiation and temperature</i></p>		
<p>Note</p>	<p><i>Content highlighted in bold italic is Separate Science specific. Pupils in 10T1 and T2 will access this curriculum.</i></p> <p><i>Content in italic has been moved from year 9 into year 10 due to COVID for all classes (Details are on the COVID catch up document)</i></p>		
<p>Skills</p>	<p>Decide on the observations and measurements that need to be taken and the degree of accuracy that is required. Set up and use a range of scientific apparatus with precision and skill. Plan (with guidance) investigations, identifying key factors that need to be considered. Present my data clearly and concisely using graphs with lines of best fit. Produce (unaided) precise plans for my investigations. Evaluate my investigations and produce structured reports. Consolidate my understanding of the core practical concepts by applying my knowledge and skills in different contexts.</p>		
<p>Rationale</p>	<p>Why? Pupils start GCSE content that has limited crossover from KS3 but extends into new knowledge and concepts.</p>	<p>Why? Pupils start GCSE content that has limited crossover from KS3 but extends into new knowledge and concepts.</p>	<p>Why? Pupils start GCSE content that has limited crossover from KS3 but extends into new knowledge and concepts.</p>



	<p>Links to prior learning: Conservation of energy- this content builds on the energy topic studied at the end of year 8.</p> <p>Genes - this content builds on the genetics topic studied at the start of year 9.</p> <p>Bonding – this content builds on the atoms, elements and compounds topic taught in year 8, the atomic structure topic in year 9.</p> <p>Waves - this content builds on the light and sound studied in year 7.</p> <p>Links to future learning: Conservation of energy- We teach this content here in preparation for the forces and effects topic (end of year 10) that has links to this content and the particle model/stretching topic in year 11.</p> <p>Genes - We teach this content here in preparation for the cell division and nervous system next term.</p> <p>Bonding – Post 16 study. A Level Chemistry</p>	<p>Links to prior learning: Cell Division and Nervous System - this content builds on the human body topic studied in year 7, the cells and control in year 9.</p> <p>Acids and Alkalis - this content builds on the acids and alkali topic studied in year 7.</p> <p>Radioactivity - this content builds on the atoms, elements and compounds topic taught in year 8, the atomic structure topic in year 9, last terms topic waves.</p> <p>Astronomy- this topic is a required element of the separate science content, it links back to the study of space in year 7 and builds on prior knowledge from there.</p> <p>Links to future learning: Cell Division and Nervous System -We teach this content here in preparation for the exchange and transport topic in year 11.</p> <p>Acids and Alkalis - We teach this content here in preparation for the calculations, electrolysis and equilibria topic next term and the <i>separate chemistry 1</i> topic.</p>	<p>Calculations, electrolysis and equilibria - We teach this content here as it is one of the more tricky concepts for pupils to grasp, and sound prior knowledge needs to underpin understanding in order to grasp the difficult aspects of calculations. (Links with maths on how to teach equations in multistep have been made)</p> <p>Ecosystems and material cycles - We teach this content here during the summer term so that pupils are able to carry out investigations outside in a diverse environment.</p> <p>Links to prior learning: Forces doing work and their effects- this aspect of the curriculum is taught here as a recap and extension of the year 7 forces and motion topic and year 8 forces stretching and squashing topic.</p> <p>Calculations, electrolysis and equilibria - this content builds on the acids and alkali topic studied in year 7, the cells and control in year 9.</p> <p>Separate chemistry 1- this content builds on the calculations, electrolysis and equilibria topic, our most able students are pushed and extended in order to be</p>
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		<p>Waves - We teach this content here in preparation for the radioactivity and astronomy topics next term.</p>	<p>Radioactivity - Post 16 study. A Level Physics</p> <p>Astronomy- Post 16 study. A Level Physics.</p>	<p>able to understand the complex ideas, skills and application of mathematical skills.</p> <p>Ecosystems and material cycles - this content builds on the ecology topic studied in year 7.</p> <p>Links to future learning: Forces doing work and their effects- Post 16 study – A Level Physics</p> <p>Calculations, electrolysis and equilibria - This topic also links onto the separate chemistry 1 topic studied by separate science next.</p> <p>Separate chemistry 1- Post 16 study. A Level Chemistry</p> <p>Ecosystems and material cycles - Post 16 study. A Level Biology</p>
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Y11 Science

YEAR 11		AUTUMN	SPRING	SUMMER
Year 11	Theme	 <p>Exchange and Transport in Animals, Organic Chemistry and Earth's Atmosphere, Electricity and Circuits, Magnets and Electromagnetic Induction</p>   	 <p>Homeostasis, Particle Model – Stretching and Squashing, <i>Separate Chemistry 2</i></p>   	Revision Exams
	Knowledge	<p><u>Exchange and transport in animals</u> Introductory lesson Efficient transport DIFFUSION AND FICKS LAW Circulatory system The heart Cellular respiration CORE PRAC respiration</p> <p><u>Organic chemistry and Earth's Atmosphere</u> Introductory lesson Hydrocarbons Fractional distillation The alkane/<i>alkene</i> homologous series Complete/incomplete combustion <i>oxidation of hydrocarbons</i> Combustible fuels and pollution Breaking down hydrocarbons</p>	<p><u>Homeostasis</u> Introductory lesson Hormones Hormones and metabolic rate The menstrual cycle Hormones and the menstrual cycle Blood Glucose Type 2 diabetes <i>2 extra lessons triple from nervous system year 9 brain/the eye</i> <i>Thermoregulation</i> <i>Osmoregulation/the kidney</i></p> <p><u>Particle Model/stretching</u> Introductory lesson Particles and density CORE PRAC densities Energy and changes of state Energy calculations</p>	



YEAR 11	AUTUMN	SPRING	SUMMER
	<p><i>Testing with bromine water</i></p> <p><i>The early atmosphere</i> <i>The changing atmosphere</i> <i>The atmosphere today</i></p>  <p><u>Electricity and Circuits</u> Introductory lesson Electrical circuits Current and potential difference Current, charge and energy Resistance More about resistance CORE PRAC resistance Transferring energy Power Transferring energy by electricity <i>Charges and static electricity</i> <i>Dangers and uses of static electricity</i> <i>Electric fields</i></p> <p><u>Magnets and electromagnetic induction</u> Introductory lesson Magnets and magnetic fields Electromagnetism Magnetic forces <i>Motor effect</i> <i>Electromagnetic induction</i> Transformers</p>	<p>CORE PRAC - investigating water Gas temperature and pressure <i>Gas pressure and volume</i> <i>Pressure in fluids</i> <i>Pressure and up thrust</i> Bending and stretching CORE PRAC - springs Extension and energy transfers</p> <p><u>Separate chemistry 2</u> <i>Introductory lesson</i> <i>Homologous series</i> <i>Polymers and addition polymerisation</i> <i>Polymer properties/uses and problems</i> <i>Alcohols and ethanol production</i> <i>Combustion of alcohols core PRAC</i> <i>Carboxylic acids</i> <i>Esters and condensation/polymerisation</i> <i>Flame tests/photometry and positive ion test</i> <i>Tests for negative ions</i> <i>Ion tests core PRAC</i> <i>Choosing materials</i> <i>Nanoparticles</i></p>	



YEAR 11		AUTUMN	SPRING	SUMMER
		Transformers and energy/ <i>turns ratio equation</i> <i>Power transmission in high powered voltage cables</i>		
	Note	<i>Content highlighted in bold italic is Separate Science specific. This content will not be taught until 2022-2023 due to the Separate Science content only being introduced from year 10 2021-2022.</i> <i>Content in italic has been moved from year 10 into year 11 due to COVID for all classes (Details are on the COVID catch up document)</i>		
	Skills	Decide on the observations and measurements that need to be taken and the degree of accuracy that is required. Set up and use a range of scientific apparatus with precision and skill. Plan (with guidance) investigations, identifying key factors that need to be considered. Present my data clearly and concisely using graphs with lines of best fit. Produce (unaided) precise plans for my investigations. Evaluate my investigations and produce structured reports. Consolidate my understanding of the core practical concepts by applying my knowledge and skills in different contexts.		
	Rationale	<p>Why? Pupils complete GCSE content that has limited crossover from KS3 but extends into new knowledge and concepts.</p> <p>Links to prior learning: Exchange and transport in animals- this content builds on the human body topic studied in year 7, gas exchange and respiration in year 8 and the cells and control in year 9.</p>	<p>Why? Pupils complete GCSE content that has limited crossover from KS3 but extends into new knowledge and concepts.</p> <p>Links to prior learning: Homeostasis - this content builds on the human body topic studied in year 7, gas exchange and respiration in year 8 and the cells and control in year 9. Particle Model/stretching - this aspect of the curriculum is taught here as a recap</p>	<p>Why? By this point, our students will only have one half term left. From using our 5 year curriculum, the foundation students will have been taught everything to allow them to achieve their target on their exam. Teachers will now follow a revision program that has been designed to recap learning, summarise it then practice exam questions using the I do, we do, you do format. We will also use walking talking mocks as an opportunity for pupils to improve their practice and extend their</p>



YEAR 11	AUTUMN	SPRING	SUMMER
	<p>Organic chemistry and Earth's Atmosphere - This aspect of the curriculum is taught here as a recap and extension of the year 7 Earth and atmosphere topic. The fundamentals are revisited and built upon to quantify all aspects of the KS4 curriculum.</p> <p>Electricity and Circuits - This aspect of the curriculum is taught here as a recap and extension of the year 8 electricity topic. The fundamentals are revisited and built upon to quantify all aspects of the KS4 curriculum.</p> <p>Magnets and electromagnetic induction - This aspect of the curriculum is taught here as a recap and extension of the year 8 magnets topic. The fundamentals are revisited and built upon to quantify all aspects of the KS4 curriculum.</p> <p>Links to future learning: Exchange and transport in animals- Post 16 study. A Level Biology/Human Biology.</p> <p>Organic chemistry and Earth's Atmosphere</p>	<p>and extension of the year 7 particle model and year 8 forces stretching and squashing topic. The fundamentals are revisited and built upon to quantify all aspects of the KS4 curriculum.</p> <p><i>Separate chemistry 2 - this content builds on the organic chemistry and Earth's atmosphere topic. Our most able students are pushed and extended in order to be able to understand the complex ideas, skills and application of knowledge.</i></p> <p>Links to future learning: Homeostasis - Post 16 study. A Level Biology/ Human Biology</p> <p>Particle Model/stretching - Post 16 study. A Level Physics.</p> <p><i>Separate chemistry 2</i> - Post 16 study. A Level Chemistry.</p>	<p>knowledge. Tassomai usage will also play an important role in exam preparation as pupils will have been using it all year by this point.</p>



YEAR 11		AUTUMN	SPRING	SUMMER
		Post 16 study. A Level Chemistry. Electricity and Circuits - Post 16 study. A Level Physics. Magnets and electromagnetic induction - Post 16 study. A Level Physics.		