

### Science Curriculum Overview – Year 11 combined science

Year 11		HT1	HT2	HT3	HT4	HT5	HT6
	<b>Topic</b>	<b>CB7</b> Animal coordination, control and homeostasis <b>CC13-15</b> Groups; energy changes and rates of reaction <b>CP9</b> Electricity and circuits	<b>CB8</b> Exchange and transport in animals <b>CC16</b> Fuels <b>CP10-11</b> Magnetism and the motor effect; electromagnetic induction	<b>CB9</b> Ecosystems and material cycles <b>CC17</b> Earth and atmospheric science <b>CP12-13</b> Particle model; forces and matter	Revision	Revision	
<b>subject</b>	<b>Why this and why now?</b>	CB7 extends knowledge of cells to organ systems in particular the endocrine system and this is compared to the nervous system taught in CB2. In CC13-15 students build on their knowledge of the periodic table and atomic structure to explore the reactivity and properties of groups 1,7 and 8 in the periodic table. The key learning point in this topic is to understand why some elements get more or less reactive down a group. This then leads to what happens when atoms react and how factors affect the rate of these reactions. Finally, students learn how to calculate the change in thermal energy when bonds are broken and formed during a chemical reaction. CP9 focuses on electricity as a type of energy and students link both	CB8 builds on knowledge of transport systems from CB1 to look at the need and importance of exchange surfaces. Students also build on their knowledge of cells to look at the specialist cells that make up blood. This is a critical topic where students link what they have learnt previously about cell organelles, enzymes in digestion and transport of oxygen to cellular respiration. In CC16 students develop their knowledge of combustion as a chemical reaction to learn about fuels and that many fuels are made from compounds called hydrocarbons. Students apply previous knowledge of separation techniques to understand how crude oil is separated into useful fuel fractions. Students also look at how toxic gases can be produced from burning fuels and the impact this has on climate change.	CB9 concludes biology and in this topic students use knowledge of organisms and the environment to look at how they interact as an ecosystem. Prior topics such as natural selection and adaptation link to biodiversity and there is linking to chemistry unit CC17 when looking at the carbon cycle. CC17 concludes chemistry and builds on the last topic in terms of carbon dioxide levels in the atmosphere, how this has changed over time and the threat of rising carbon dioxide levels. Students look at the early atmosphere and from previous topic of metal extraction should see that early earth had little to no oxygen in the atmosphere as rocks from when the Earth formed do not contain oxidised compounds. In the final topic of Physics the fundamental ideas of energy, matter and forces	To prepare for final GCSE examinations	To prepare for final GCSE examinations	

	chemistry and physics together to understand what current is and potential difference and how this is different in series and parallel circuits.	In CP10-11 the topic of forces is revisited to look at magnetism as a non-contact force and the effects of electricity and magnetism together.	come together to look at changes of state, specific and latent heat and energy changes in a stretching spring.			
What is the essential knowledge that needs to be remembered?	<p><b>CB7 Animal coordination, control and homeostasis</b> What hormones are and where they are produced. The names of some target organs. The effects of Thyroxine and Adrenaline. The role of oestrogen and progesterone in the menstrual cycle and apply this to how contraceptives work. The role of FSH and LH. How blood glucose is regulated in the body including people with diabetes Types 1 and 2. How to calculate BMI.</p> <p><b>CC13-15 Structure and properties of groups 1, 7 and 0, Rates of reaction, energy changes in reaction</b> Structure and properties of group 1,7 and 0 of the periodic table Factors affecting the rate of reactions including collision theory. Catalysts and activation energy. Energy changes in reactions including</p>	<p><b>CB8 Exchange and transport in animals</b> The efficient transport and exchange of substances in the body at different surfaces including surface area to volume calculation, structure and function of the heart and circulatory system, Blood composition Cardiac output calculations, cellular respiration</p> <p><b>CC16 Fuels</b> Formation of crude oil and how crude oil can be separated into useful fractions, alkanes and alkenes, combustion both complete and incomplete, cracking and polymerisation, fuels and pollution and alternative fuels such as hydrogen</p> <p><b>CP10 Magnets and Magnetic Fields</b> The use and shape of magnetic fields, evidence of the earth's magnetic field and its effect. Construction of electromagnets and factors affecting its strength. Fleming left hand rule.</p>	<p><b>CB9 Ecosystems and Material Cycle</b> Interactions of ecosystems and sampling methods. Biotic and abiotic factors and how they affect communities. Relationships between organisms (Parasitism and Mutualism). Human effects on biodiversity and conservation (Eutrophication). Water, Carbon and Nitrogen cycles.</p> <p><b>CC17 Earth and Atmospheric Science</b> Composition and evolution of earth's atmosphere including key events, formation of oceans, and levels of oxygen through photosynthesis. Composition of the modern atmosphere, and the effects of greenhouse gases on climate change and limiting the impact of greenhouse gases</p> <p><b>CP12-13 Particle Model, Forces and Matter</b> Kinetic theory, investigating density, including</p>	Revision	Revision	

		<p>exothermic and endothermic reactions, calculation bond energies.</p> <p><b>CP9 Electricity and circuits</b> Atomic structure and current flow. Series and parallel circuits. Current and Potential difference. How to calculate energy and charge. Investigate, explain and calculate resistance in series and parallel circuits. Identify resistance curves. Explain the heating effect caused by resistance. Calculating electrical power. Electrical safety including fuses and circuit breakers. The national grid, AC and DC. Understand the power rating of appliances.</p>	<p>Transformers including the transformer equation. The use of transformers in the national grid.</p>	<p>calculations. Effects of energy on changes of state, energy calculations (specific and latent heat). Temperature scales and effects on gas pressure, relationship between force and extension of a spring, calculating work done in springs.</p>			
	<p><b>What is the assessment intent and how will you assess?</b></p>	<p>Assessment intent: to inform planning, intervention and identify any gaps. Check mastery in fundamental concepts ready for other units and to prevent curriculum dysfluency whilst checking learning and performance. <b>Formative Baseline; End of topics test and rewind grids</b> to identify misconceptions and gaps in learning to allow for Make It Better time. <b>Cumulative Assessment</b></p>	<p>Assessment intent: to inform planning, intervention and identify any gaps. Check mastery in fundamental concepts ready for other units and to prevent curriculum dysfluency whilst checking learning and performance. <b>Formative Baseline; End of topics test and rewind grids</b> to identify misconceptions and gaps in learning to allow for Make It Better time. <b>Cumulative Assessment</b> based on CB8, CC16 and CP10-11. Extended answer</p>	<p>Assessment intent: to inform planning, intervention and identify any gaps. Check mastery in fundamental concepts ready for other units and to prevent curriculum dysfluency whilst checking learning and performance. <b>Formative Baseline; End of topics test and rewind grids</b> to identify misconceptions and gaps in learning to allow for Make It Better time. <b>Cumulative Assessment</b> based on CB9, CC17 and</p>			

	<p>based on CB7, CC13-15 and CP9. Extended answer questions as well as short answer, discuss and compare questions.</p> <p>Students complete Autumn mock assessment that will allow us to identify knowledge, understanding and skill gaps that we need to readdress before formal examinations.</p>	<p>questions as well as short answer, discuss and compare questions.</p>	<p>CP12-13. Extended answer questions as well as short answer, discuss and compare questions.</p> <p>Students complete Spring mock assessment that will allow us to identify knowledge, understanding and skill gaps that we need to readdress before formal examinations.</p>			
<p><b>What should the end point look like?</b></p>	<p><b>CB7 Animal coordination, control and homeostasis</b> Describe what hormones are, identify hormones by name and state where they are produced, state the names of some target organs, describe and explain the effects of Thyroxine and Adrenaline, explain the role of hormones in menstrual cycle and apply this to how contraceptives work, explain how blood glucose is regulated in the body including people with diabetes Types 1 and 2, Calculate BMI and explain how obesity is linked to type 2 diabetes</p> <p><b>CC13-15 Structure and properties of groups 1, 7 and 0, Rates of reaction, energy changes in reaction</b></p>	<p><b>CB8 Exchange and transport in animals</b> State substances that need to be transported, describe and explain what makes an efficient exchange surface and calculate surface area to volume ratio, describe the structure and function of the heart including valves and circulatory system, describe blood composition and calculate cardiac output and stroke volume, describe cellular respiration and compare aerobic and anaerobic respiration</p> <p><b>CC16 Fuels</b> Describe how crude oil is formed, explain why crude oil is a finite resource, define the term 'hydrocarbon', describe how fractional distillation is used to separate crude oil into useful fractions, state and describe the use of each fraction, describe and</p>	<p><b>CB9 Ecosystems and Material Cycle</b> Demonstrate interactions of ecosystems by drawing food chains, describe sampling methods, identify biotic and abiotic factors and describe how they affect communities, describe and explain relationships between organisms (Parasitism and Mutualism), identify and describe human effects on biodiversity and conservation (Eutrophication), describe and explain key processes in water, Carbon and Nitrogen cycles.</p> <p><b>CC17 Earth and Atmospheric Science</b> Identify and describe the composition and evolution of earth's atmosphere including key events, formation of oceans, and levels of oxygen through</p>			

	<p>State names of group 1,7 and 0 and describe their atomic structure in terms of outer electrons, describe the properties both physical and chemical of each group, identify factors that affect the rate of reaction and explain collision theory, Describe and explain the action of catalysts and how they lower activation energy, identify energy changes in reactions as being exothermic and endothermic reactions, describe that endothermic involves breaking bonds and exothermic is forming bonds, calculate overall energy changes using known bond energies</p> <p><b>CP9 Electricity and circuits</b> Describe atomic structure and current flow, draw series and parallel circuits and describe the current and potential difference in series and parallel circuits, describe how to measure current and potential difference in a series and a parallel circuit, calculate energy and charge, investigate, explain and calculate resistance in series and parallel circuits. Identify</p>	<p>explain the properties of fractions as you go from top to bottom, describe the homologous group known as the alkanes and how they bond, describe the complete and incomplete combustion of fuels using word and symbol equations, explain how the products of combustion can be dangerous, describe how carbon, sulfur dioxide and nitrous oxides cause pollution and evaluate alternative fuels to fossil fuels</p> <p><b>CP10 Magnets and Magnetic Fields</b> Draw magnetic fields around a bar magnet and a wire, suggest evidence of the earth's magnetic field and its effect, construction of electromagnets and factors affecting its strength, describe Fleming left hand rule and the motor effect, describe and explain transformers including the transformer equation, explain the use of transformers in the national grid.</p>	<p>photosynthesis, describe composition of the modern atmosphere, and explain the effects of greenhouse gases on climate change and limiting the impact of greenhouse gases</p> <p><b>CP12-13 Particle Model, Forces and Matter</b> Explain kinetic theory, investigate and calculate density in solids and liquids, explain effects of energy on changes of state, energy calculations (specific and latent heat),compare temperature scales, describe and explain effects on gas pressure, explain relationship between force and extension of a spring, calculate work done in springs.</p>			
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	<p>resistance curves, Explain the heating effect caused by resistance, calculate electrical power, describe electrical safety devices including fuses and circuit breakers and Earth wire, describe the national grid, compare AC and DC, describe the power rating of appliances and explain what the power rating shows</p>					
<p><b>How does it cover the NC</b></p>	<p><b>CB7</b></p> <ul style="list-style-type: none"> <li>principles of nervous coordination and control in humans</li> <li>the relationship between the structure and function of the human nervous system</li> <li>the relationship between structure and function in a reflex arc</li> <li>principles of hormonal coordination and control in humans</li> <li>hormones in human reproduction, hormonal and non-hormonal methods of contraception</li> <li>homeostasis.</li> </ul> <p><b>CC13-15</b></p> <p>position of elements in the Periodic Table in relation</p>	<p><b>CB8</b></p> <ul style="list-style-type: none"> <li>the need for transport systems in multicellular organisms, including plants</li> <li>the relationship between the structure and functions of the human circulatory system.</li> </ul> <p><b>CC16</b></p> <p>fractional distillation of crude oil and cracking to make more useful materials</p> <p><b>CP10-11</b></p> <ul style="list-style-type: none"> <li>exploring the magnetic fields of permanent and induced magnets, and the Earth's magnetic field, using a compass</li> <li>magnetic effects of currents, how solenoids enhance the effect</li> <li>how transformers are used</li> </ul>	<p><b>CB9</b></p> <ul style="list-style-type: none"> <li>levels of organisation within an ecosystem</li> <li>some abiotic and biotic factors which affect communities;</li> <li>the importance of interactions between organisms in a community</li> <li>how materials cycle through abiotic and biotic components of ecosystems</li> <li>the role of microorganisms (decomposers) in the cycling of materials through an ecosystem</li> <li>organisms are interdependent and are adapted to their environment</li> <li>the importance of biodiversity</li> <li>methods of identifying species and measuring distribution, frequency and abundance of</li> </ul>			

	<p>to their atomic structure and arrangement of outer electrons properties and trends in properties of elements in the same group</p> <ul style="list-style-type: none"> <li>• Measurement of energy changes in chemical reactions (qualitative)</li> <li>• Bond breaking, bond making, activation energy and reaction profiles (qualitative).</li> </ul> <p>factors that influence the rate of reaction: varying temperature or concentration, changing the surface area of a solid reactant or by adding a catalyst</p> <p><b>CP9</b></p> <ul style="list-style-type: none"> <li>• measuring resistance using p.d. and current measurements</li> <li>• exploring current, resistance and voltage relationships for different circuit elements; including their graphical representations</li> <li>• quantity of charge flowing as the product of current and time</li> <li>• drawing circuit diagrams; exploring equivalent resistance for resistors in series</li> <li>• the domestic a.c. supply; live, neutral and earth mains wires, safety measures</li> <li>• power transfer related to p.d. and current, or current and resistance.</li> </ul>	<p>in the national grid and the reasons for their use.</p>	<p>species within a habitat</p> <ul style="list-style-type: none"> <li>• positive and negative human interactions with ecosystems.</li> </ul> <p><b>CC17</b></p> <ul style="list-style-type: none"> <li>• evidence for composition and evolution of the Earth's atmosphere since its formation</li> <li>• evidence, and uncertainties in evidence, for additional anthropogenic causes of climate change</li> <li>• potential effects of, and mitigation of, increased levels of carbon dioxide and methane on the Earth's climate</li> <li>• common atmospheric pollutants: sulphur dioxide, oxides of nitrogen, particulates and their sources</li> </ul> <p><b>CP12-13</b></p> <ul style="list-style-type: none"> <li>• relating models of arrangements and motions of the molecules in solid, liquid and gas phases to their densities</li> <li>• melting, evaporation, and sublimation as reversible changes</li> <li>• calculating energy changes involved on heating, using specific heat capacity; and those involved in changes of state, using specific latent heat</li> <li>• links between pressure and temperature of a gas at constant volume, related to the motion of its particles (qualitative).</li> </ul>			
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