

Science Yr 10 combined LTP (Academic Year 2023-24)

Year 10		HT1	HT2	HT3	HT4	HT5	HT6
subject	Topic	CB2 Cells and control CC3-4 Atomic structure and the periodic table CP3 Energy stores and transfers	CB3 Genetics CC5-7 Bonding CP4-5 Waves, light and the EM Spectrum	CB4 Natural selection and Genetic Modification CC8 Acids CC9 Calculations involving Masses	CB5 Health and Disease CC10-12 Electrolysis and Obtaining Metals CP6 Radiation	Recap of Key concepts and revision for end of year mock	CB6 Plants and their functions CP7-8 Forces and their effects
	Why this and why now?	CB2 builds on knowledge of cells from key concepts of biology to look at how cells divide and why this is how organisms grow if they are multicellular and differentiate into different kinds of cells. Stem cells are introduced and compared in both animals and plants as is their growth. Finally, the unit goes further into the understanding of neurones in the nervous system. CC3-4 Students build on their prior understanding of atomic structure to determine electronic configuration and draw atoms for the first 20 elements. Students also learn what an isotope is and how to calculate the average atomic mass of multiple isotopes. Students not only look at the periodic table in terms of the groups and	CB3 genetics introduces students to the structure and function of DNA and how genes are inherited. Students also develop their understanding of cell division. CC5-7 builds on the knowledge of atomic structure and the periodic table to look at how and why atoms bond together and compare the structures of ionic, covalent, metallic and giant covalently bonded substances. CP4-5 In the previous physics topic students have learnt about energy and in CP4-5 students learn that energy moves from one place to another as a wave. They learn about types of waves in particular the electromagnetic	CB4 builds on students understanding of DNA and inheritance to introduce students to natural selection, selective breeding and genetic engineering and this will allow them to learn how DNA can be manipulated and changed through scientific processes. CC8 acids students learn what acids and alkalis are in terms of ions, the chemical reactions between acids and alkalis and separation techniques learnt in CC1 are put into practice when students make salts through neutralisation. CC9 In previous chemistry unit's students have looked at atomic structure, deducing chemical formulae and writing and balancing symbol equations. Students build on	CB5 The final topic of paper 1 biology builds on their previous knowledge of cells to introduce students to diseases and how the body made from cells, tissues and organs can be damaged by communicable and non-communicable diseases and how the cells of the immune system work to protect us. CC10-12 In the final topic of paper 1 chemistry builds on atomic structure and ionic bonding to introduce electrolysis and how this is used to extract highly reactive metals. CP6 In the final topic of paper 1 physics students extend their knowledge and understanding of energy and waves in terms of absorption, transmission and reflection to radiation as radioactive materials emit waves.	Students are introduced to the key concepts of biology, chemistry and physics in HT5 and HT6 of year. In this half term students' recap the key concepts and consolidate prior learning and apply learning to exam paper questions. This is also an opportunity to focus on working scientifically, literacy and maths skills.	CB6 builds on student's prior knowledge of specialised plant cells and growth in plants to introduce how the leaf is designed for photosynthesis and how different factors affect photosynthesis. In CP7-8 students use their prior knowledge and understanding of forces to explain how different forces interact and the link between energy and forces.

	<p>periods but also the history of the periodic table. CP3 Students have learnt about forces and motion in CP1 and CP2 and here students are introduced to the concept of energy stores and transfers.</p>	<p>spectrum and how to calculate wave speed. Linking the topic of energy and waves even further students learn that the higher the frequency of a wave the more energy it is carrying and this can make some waves dangerous.</p>	<p>previous knowledge to understand how calculate relative formula mass, conservation of mass and how this allows us to find out unknown masses and finally uses masses and relative formula masses to calculate the number of moles.</p>			
<p>What is the essential knowledge that needs to be remembered?</p>	<p><u>CB2 Cells and control</u> – mitosis, growth in animals and plants, stem cells in animals and plants, nervous system and neurotransmission s</p> <p><u>CC3-4 Atomic structure and periodic table</u>– Structure of an atom, atomic number and mass number, isotopes and how to calculate average relative atomic mass of isotopes, periodic table, atomic number and the periodic table and its historical development, electronic configuration</p> <p><u>CP3 Energy stores</u> Energy storage and transfer; energy transfer diagrams; calculating efficiency; reduction of wasted energy; gravitational potential; kinetic energy; renewable</p>	<p><u>CB3 Genetics</u> introduces students to the structure and function of DNA and how genes are inherited. Students also develop their understanding of cell division.</p> <p><u>CC5-7 – Bonding</u> Ionic bonds, ionic lattices and properties of ionic compounds, covalent bonds, molecular compounds, allotropes of carbon, properties of metals and bonding models</p> <p><u>CP4-5 Waves and the Electromagnetic Spectrum</u> That waves transfer energy and not matter. Know: the terms</p>	<p><u>CB4 Natural Selection and Genetic Modification</u> Evidence of Human evolution (stone tools & fossils). Darwin’s theory of natural selection, organism classification (prokaryote, eukaryote & Archae). Selective breeding in plants & animals. Genetic engineering including function of restriction & sticky ends. Ethical arguments for genetic modification in Agriculture & animals. <u>CC8 Acids</u> PH of acids and alkaline and their respective differences and reactions; methods such as neutralising acids and producing soluble salt</p>	<p><u>CB5 health and disease</u> Definition of health and disease; difference between communicable and non-communicable; causes of malnutrition and obesity; treatment and cause of cardiovascular disease; causes of different infectious diseases; difference between an epidemic and a pandemic; physical and chemical barriers in the body; prevention of STD’s; immune system function and use of medicines including antibiotics</p> <p><u>CC10-12 Electrolysis, Extracting Metals and Equilibria</u></p>		<p><u>CB6 Plant structures and their functions</u> Leaf structure and function of parts. Photosynthesis equation and type of reaction, factors that affect it. Transpiration, structure and function of root hair cells. Translocation. Xylem and phloem.</p> <p><u>CP7-8 Forces and effects:</u> Changes in Energy, Work and Power. Contact and non-contact forces and how pairs of forces are represented. Mass and gravity. Comparison of gravitational and magnetic fields.</p>

		<p>and non-renewable energy</p>	<p>frequency, wavelength, amplitude, period, wave velocity; the difference between longitudinal and transverse waves, equations for Wave Speed, refraction at a boundary and investigating these concepts.</p>	<p>; balancing equations; common hazard symbols; metal and metal compounds and their reactions; soluble salt reactions; symbol state in equations.</p> <p><u>CC9 Calculations involving masses</u></p> <p>How to use relative atomic masses to calculate relative formula masses for elements and compounds, work out empirical and molecular formulae of compounds as well as calculate mass of reactants & products in reactions. Calculate concentrations of a solution, know Avogadro's constant & Calculate the numbers of particles in a substance</p>	<p>What electrolytes are and in what states of matter they exist; electrolysis uses direct current to decompose electrolytes Which electrodes reduction and oxidation occur. What products are formed in the electrolysis of copper sulfate solution, using copper electrodes. Most metals are extracted from ores found in the Earth's Crust as the un-combined elements and is a reduction reaction What the life-cycle assessment for a product involves That some chemical reactions are reversible and use the symbol \rightleftharpoons in equations. The formation of ammonia is a reversible reaction that can reach a dynamic equilibrium, The conditions needed for the Haber process.</p> <p><u>CP6 Radiation</u></p> <p>Know how atomic models changed over time leading to the current atomic model</p>		<p>Resolving resultant forces and free-body force diagrams.</p>
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	<p>checking learning and performance.</p> <p>Formative Baseline; End of topics test and rewind grids to identify misconceptions and gaps in learning to allow for Make It Better time.</p> <p>Cumulative Assessment based on CB2, CC3-4 and CP3. Extended answer questions as well as short answer, discuss and compare questions.</p>	<p>checking learning and performance.</p> <p>Formative Baseline; End of topics test and rewind grids to identify misconceptions and gaps in learning to allow for Make It Better time.</p> <p>Cumulative Assessment based on CB3, CC5-7 and CP4-5. Extended answer questions as well as short answer, discuss and compare questions.</p>	<p>checking learning and performance.</p> <p>Formative Baseline; End of topics test and rewind grids to identify misconceptions and gaps in learning to allow for Make It Better time.</p> <p>Cumulative Assessment based on CB4, CC8 and CC9. Extended answer questions as well as short answer, discuss and compare questions.</p>	<p>checking learning and performance.</p> <p>Formative Baseline; End of topics test and rewind grids to identify misconceptions and gaps in learning to allow for Make It Better time.</p> <p>Cumulative Assessment based on CB5, CC10-12 and CP6. Extended answer questions as well as short answer, discuss and compare questions.</p>	<p>checking learning and performance.</p> <p>Formative Baseline; End of topics test and rewind grids to identify misconceptions and gaps in learning to allow for Make It Better time.</p> <p>Cumulative Assessment GCSE Paper 1 mock exams</p>	<p>checking learning and performance.</p> <p>Formative Baseline; End of topics test and rewind grids to identify misconceptions and gaps in learning to allow for Make It Better time.</p> <p>Cumulative Assessment based on CB6 and CP7-8. Extended answer questions as well as short answer, discuss and compare questions.</p>
<p>What does the end point look like?</p>	<p>CB2 Cells and control</p> <p>Describe mitosis as a type of cell division, identify and describe the stages of mitosis using microscopic images of cell division, define and understand the terms diploid and haploid, describe what is meant by growth and explain how to use percentile growth charts and use them to determine whether or not growth is healthy or not, describe growth in plants and explain the function of meristems, describe and explain the function of</p>	<p>CB3 Genetics</p> <p>Compare mitosis and meiosis, describe structure of DNA, be able to extract DNA experimentally or know the method, state the causes genetic mutation and variation, draw punnett crosses and show how gender is inherited</p> <p>CC5-7 Bonding</p> <p>Describe how atoms form ions, describe how ions form ionic bonds, describe and explain the properties of ionic</p>	<p>CB4 Human Evolution and Selective Breeding:</p> <p>Evidence human evolution. Categorise plants animals into domains and kingdoms. Discuss Darwin's theory of evolution / natural selection. Compare selective breeding and genetic engineering and the ethics of both</p> <p>CC8 Acids</p> <p>Identify and explain the ions in acids and alkalis</p>	<p>CB5 Health and Disease</p> <p>Define health and disease, explain the difference between communicable and non-communicable, identify causes of malnutrition and obesity, describe treatment and cause of cardiovascular disease, describe causes of different infectious diseases, explain the difference between an epidemic and a pandemic, describe and explain physical and chemical barriers in the body, describe the prevention of STD's,</p>		<p>CB6 Plant structures and their functions</p> <p>Identify leaf structures and describe their function, State the photosynthesis equation and explain what type of reaction it is, identify and describe factors that affect rate of photosynthesis. Explain transpiration, describe the structure and function of root hair cells, describe and explain how water and sucrose and amino acids are transported through both transpiration and</p>

		<p>stem cells and compare embryonic and adult stem cells, identify and describe the structure of sensory, motor and relay neurones, describe and explain the nervous response from stimulus to response and compare the reflex and conscious action</p> <p>CC3-4 Atomic structure and periodic table</p> <p>Describe the structure of an atom in terms of position, mass and charges of subatomic particles, define atomic number and atomic mass, describe isotopes and calculate average relative atomic mass, draw the first 20 elements of the periodic table and state their electronic configuration, describe the history of the periodic table, compare Mendeleev and the modern periodic table,</p> <p>CP3 Energy stores</p> <p>Explain and represent in diagrams how energy is</p>	<p>compounds, deduce ionic formula from charged ions, describe covalent bonds, compare ionic and covalent bonds and draw both types of bonding, describe metallic bonding, explain the properties and bonding of allotropes of carbon, use bonding models</p> <p>CP4-5 Waves and the Electromagnetic spectrum,</p> <p>Identify that there are two types of wave</p> <p>Understand how waves travel</p> <p>Calculate wave speed</p> <p>Describe a range of electromagnetic waves</p> <p>Describe EM waves can as useful as well as harmful</p> <p>Explain how light waves behave when travelling through different media.</p>	<p>Define pH and link to concentration</p> <p>Describe neutralisation using word and symbol equations and balancing equations</p> <p>Compare the use of different indicators</p> <p>Describe the preparation of soluble and insoluble salts</p> <p>Explain the difference between strength and concentration of acids</p> <p>Describe using word and balanced symbol equations the reaction of metals and metal compounds with acids</p> <p>CC9 Calculations involving masses:</p> <p>Calculate relative formula masses for elements and compounds</p> <p>Work out empirical and molecular formulae of compounds</p> <p>Calculate the mass of reactants or</p>	<p>describe and explain the immune system function and describe use of medicines including antibiotics</p> <p>CC10-12 Electrolysis, Extracting Metals and Equilibria</p> <p>Describe what electrolytes are and in what states of matter they exist, define electrolysis, identify electrodes, describe what happens during electrolysis and explain how reduction and oxidation occur, state what products are formed in the electrolysis of copper sulfate solution, using copper electrodes, describe reactivity of metals and explain how reactivity relates to how they are extracted from ores, describe what the life-cycle assessment for a product involves, state that some chemical reactions are reversible and use the symbol \rightleftharpoons in equations, state the equation to show the formation of ammonia and describe it as a reversible reaction that</p>		<p>translocation via xylem and phloem.</p> <p>CP7-8 Forces and effects:</p> <p>Describe changes in Energy, describe what is meant by work done and Power including knowing and stating the equations, identify contact and non-contact forces show how pairs of forces are represented, explain the difference between Mass and gravity, compare gravitational and magnetic fields, solve resolving resultant forces and draw free-body force diagrams.</p>
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				their ionising and penetration abilities		
How does it cover the NC?	<p><u>KS4 working Scientifically</u></p> <p>-Working scientifically</p> <p>-Development of scientific thinking</p> <p>-Experimental skills and strategies</p> <p>-Analysis and evaluation</p> <p>-Vocabulary, units, symbols and nomenclature</p> <p>Cells and Control (CB2)</p> <p>stem cells in animals and meristems in plants</p> <p>principles of nervous coordination and control in humans</p> <p>the relationship between the structure and function of the human nervous system</p>	<p><u>KS4 working Scientifically</u></p> <p>-Working scientifically</p> <p>-Development of scientific thinking</p> <p>-Experimental skills and strategies</p> <p>-Analysis and evaluation</p> <p>-Vocabulary, units, symbols and nomenclature</p> <p>Genetics (CB3)</p> <p>Inheritance and variation</p> <p>Bonding (CC5-7)</p> <p>types of chemical bonding: ionic, covalent, and metallic</p> <p>bulk properties of materials related to bonding and intermolecular forces</p> <p>bonding of carbon leading to the vast array</p>	<p><u>KS4 working Scientifically</u></p> <p>-Working scientifically</p> <p>-Development of scientific thinking</p> <p>-Experimental skills and strategies</p> <p>-Analysis and evaluation</p> <p>-Vocabulary, units, symbols and nomenclature</p> <p>Natural selection and Genetic modification (CB4)</p> <p>The evidence for evolution</p> <p>Developments in biology affecting classification</p> <p>The importance of selective breeding of plants and animals in agriculture</p>	<p><u>KS4 working Scientifically</u></p> <p>-Working scientifically</p> <p>-Development of scientific thinking</p> <p>-Experimental skills and strategies</p> <p>-Analysis and evaluation</p> <p>-Vocabulary, units, symbols and nomenclature</p> <p>Health and Disease (CB5)</p> <p>The relationship between health and disease</p> <p>communicable diseases including sexually transmitted infections in humans (including HIV/AIDs)</p> <p>non-communicable diseases</p>	<p><u>KS4 working Scientifically</u></p> <p>-Working scientifically</p> <p>-Development of scientific thinking</p> <p>-Experimental skills and strategies</p> <p>-Analysis and evaluation</p> <p>-Vocabulary, units, symbols and nomenclature</p>	<p><u>KS4 working Scientifically</u></p> <p>-Working scientifically</p> <p>-Development of scientific thinking</p> <p>-Experimental skills and strategies</p> <p>-Analysis and evaluation</p> <p>-Vocabulary, units, symbols and nomenclature</p> <p>Plants and their functions(CB6)</p> <p>photosynthesis as the key process for food production and therefore biomass for life • the process of photosynthesis • factors affecting the rate of photosynthesis</p> <p>Forces and effects (CP7-8)</p> <p>forces and fields: electrostatic, magnetic,</p>

		<p>the relationship between structure and function in a reflex arc</p> <p>Atomic structure and the periodic table (CC3-4)</p> <p>A simple model of the atom consisting of the nucleus and electrons, relative atomic mass, electronic charge and isotopes</p> <p>the number of particles in a given mass of a substance</p> <p>the modern Periodic Table, showing elements arranged in order of atomic number</p> <p>position of elements in the Periodic Table in relation to their atomic structure and arrangement of outer electrons</p> <p>properties and trends in properties of elements in the same group</p> <p>characteristic properties of metals and non-metals</p>	<p>of natural and synthetic organic compounds that occur due to the ability of carbon to form families of similar compounds, chains and rings</p> <p>structures, bonding and properties of diamond, graphite, fullerenes and graphene</p> <p>Waves (CP4-5)</p> <p>Amplitude, wavelength, frequency, relating velocity to frequency and wavelength</p> <p>transverse and longitudinal waves electromagnetic waves, velocity in vacuum; waves transferring energy; wavelengths and frequencies from radio to gamma-rays</p>	<p>The uses of modern biotechnology including gene technology; some of the practical and ethical considerations of modern biotechnology.</p> <p>Acids (CC8)</p> <p>The chemistry of acids; reactions with some metals and carbonates</p> <p>pH as a measure of hydrogen ion concentration and its numerical scale.</p> <p>Calculations (CC9)</p> <p>determination of empirical formulae from the ratio of atoms of different kinds</p> <p>balanced chemical equations, ionic equations and state symbols</p>	<p>Radioactivity (CP6)</p> <p>ionisation; absorption or emission of radiation related to changes in electron orbits</p> <p>radioactive nuclei: emission of alpha or beta particles, neutrons, or gamma-rays, related to changes in the nuclear mass and/or charge</p>	<p>gravity • forces as vectors • calculating work done as force x distance</p>
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		<p>chemical reactivity of elements in relation to their position in the Periodic Table</p> <p><u>Energy (CP3)</u></p> <p>Energy changes in a system involving heating, doing work using forces, or doing work using an electric current: calculating the stored energies and energy changes involved.</p>					
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