Year 11, Subject Curriculum Overview

	Autumn Term 1 B5 recap C16/17 recap P13 C9 C12	Autumn Term 2 P9 C14 C15	Spring Term 1 B7 C10 P10
Overview of Scheme of Learning	B5 - Recap the entire topic as it was taught in lockdown. (5 lessons max) C16/17 - Recap the entire topic as it was taught in lockdown. (5 lessons max) P13 - Explain, using springs and other elastic objects, that stretching, bending or compressing an object requires more than one force. - Define elastic and inelastic distortion. - Recall and use the equation for Hooke's Law. - Correctly use the given equation for calculating work done on a spring. - Describe the difference between linear and non-linear relationships between force and extension. - Core Practical. C9 - Be able to calculate the relative formula mass from the relative atomic mass.	C14 - Be able to suggest methods for determining the rate of a given reaction. - Core Practical. - Explain that reactions occur when particles collide. - Explain that rates of reaction increase when the frequency and/or energy of the collisions increases. - Explain the effects of temperature, concentration, surface area to volume ratio of a solid and pressure (on reactions involving gases) on the rate of reaction. - Define a catalyst. - Explain the effect of a catalyst on the activation energy of a reaction. - Recall the definition of an enzyme. - Be able to interpret data on graphs of mass, concentration or volume of reactant or product against time. C15 - Understand that heat energy changes occur in the following reactions; A salts dissolving in water	B7 - Define a Hormone. - Describe where they are made and how they are transported around the body. - Name the key endocrine glands and the hormones they make. - Explain the function of adrenalin, where it is made and the effects it has on the body (HT) - Explain how thyroxine controls metabolic rate as an example of negative feedback. (HT) - Be able to describe the stages of the menstrual cycle and the roles of oestrogen and progesterone in controlling it. - Explain the interactions of oestrogen, progesterone, FSH and LH in the control of the menstrual cycle, including the repair and maintenance of the uterus wall, ovulation and menstruation. (HT)

	- Be able to calculate percentage by mass of an element in a compound given relative atomic masses. - Be able to calculate the formulae of simple compounds from reacting masses or percentage composition. - Understand that these are the empirical formulae. - Be able to deduce the empirical formula of a compound from the formula of its molecule. - Be able to deduce the molecular formula of a compound from its empirical formula and its relative molecular mass. - Describe an experiment to determine the empirical formula of a simple compound such as magnesium oxide. - Explain the law of the conservation of mass as it applies to an open and closed system. - Calculate masses of reactants and products from balanced equations, given the mass of one substance. - Calculate the concentration of solutions in g dm–3. - Explain why, in a reaction, the mass of product formed is controlled by the mass of the reactant which is not in excess. (HT) - Define one mole of a substance (HT).	B neutralisation reactions C displacement reactions D precipitation reactions - Define an exothermic reaction. - Define an endothermic reaction. - Understand that the breaking of bonds is endothermic and the making of bonds is exothermic. - Define activation energy. - Be able to draw and label a reaction profile for an exothermic and endothermic reaction. P9 - Be able to draw and use electric circuit diagrams representing them with the conventions of positive and negative terminals, and the symbols that represent cells, including batteries, switches, voltmeters, ammeters, resistors, variable resistors, lamps, motors, diodes, thermistors, LDRs and LEDs. - Understand the difference between series and parallel circuits. - Know how to set up a voltmeter to measure potential difference. - Explain what potential difference is. - Know how to set up an ammeter to measure current.	- Explain how hormonal contraception influences the menstrual cycle and prevents pregnancy. - Be able to evaluate the hormonal and barrier methods of contraception. - Explain the use of hormones in Assisted Reproductive Technology (ART) including IVF and clomifene therapy. (HT) - Explain the importance of maintaining a constant internal environment in response to internal and external change. - Explain how the hormone insulin controls blood glucose concentration. - Explain how blood glucose is regulated by Glucagon. (HT) - Explain the cause of types 1 and 2 diabetes and how they are controlled. - Be able to evaluate the correlation between body mass and type 2 diabetes including waist:hip calculations and BMI. C10 - Describe electrolysis as a process in which electrical energy, from a direct current supply, decomposes electrolytes. - Explain the movement of ions during electrolysis, in which: a positively charged cations migrate to the negatively charged cathode

	- Be able to deduce the stoichiometry of a reaction from the masses of the reactants and products. - Calculate the number of moles of particles of a substance in a given mass of that substance and vice versa. - Calculate the number of particles of a substance in a given number of moles of that substance and vice versa. - Calculate the number particles of a substance in a given mass of that substance and vice versa. - Deduce the stoichiometry of a reaction from the masses of the reactants and products. C12 - Understand that some reactions are reversible. - Understand that the direction of some reversible reactions can be altered by changing the reaction conditions. - Define Dynamic Equilibrium. - Be able to describe how the formation of ammonia is a reversible reaction between Hydrogen and Nitrogen and that is can reach a state of dynamic equilibrium.	- Explain that an electric current as the rate of flow of charge and the current in metals is a flow of electrons. - Use the equations E= Q x V and Q = I x T. - Understand current is conserved at a junction in a circuit. - Use the equation V = I x R. - Explain why, if two resistors are in series, the net resistance is increased, whereas with two in parallel the net resistance is decreased. - Core practical. - Explain how current varies with potential difference for the following devices and how this relates to resistance a filament lamps b diodes c fixed resistors. - Describe how the resistance of a light-dependent resistor (LDR) varies with light intensity. - Describe how the resistance of a thermistor varies with change of temperature. - Explain that electrical energy is dissipated as thermal energy in the surroundings when an electrical	b negatively charged anions migrate to the positively charged anode. - Explain the formation of the products in the electrolysis, using inert electrodes, of some electrolytes, including: a copper chloride solution b sodium chloride solution c sodium sulfate solution d water acidified with sulfuric acid e molten lead bromide (demonstration). - Be able to write half equations for reactions occurring at the anode and cathode in electrolysis. (HT) - Explain the formation of the products in the electrolysis of copper sulfate solution, using copper electrodes, and how this electrolysis can be used to purify copper. - Core practical. P10 - To know that unlike magnetic poles attract and like magnetic poles repel. - Describe the uses of permanent and temporary magnetic materials including cobalt, steel, iron and nickel.

	- Predict how the position of a dynamic equilibrium reaction can be altered by temperature, pressure and concentration. (HT)	current does work against electrical resistance. - Describe power as the energy transferred per second and recall that it is measured in watt. - Describe how, in different domestic devices, energy is transferred from batteries and the a.c. mains to the energy of motors and heating devices. - Explain the difference between direct and alternating voltage. - Describe direct current (d.c.) as movement of charge in one direction only and recall that cells and batteries supply direct current (d.c.). - Describe that in alternating current (a.c.) the movement of charge changes direction. - Know that in the UK the domestic supply is a.c., at a frequency of 50 Hz and a voltage of about 230 V. - Explain the difference in function between the live and the neutral mains input wires. - Explain the function of an earth wire and of fuses or circuit breakers in ensuring safety. Explain why switches and fuses should be connected in the live wire of a domestic circuit.	- Explain the difference between permanent and induced magnets. - Describe the shape and direction of the magnetic field around bar magnets and for a uniform field, and relate the strength of the field to the concentration of lines. - Explain how the behaviour of a magnetic compass is related to evidence that the core of the Earth must be magnetic. - Describe how to show that a current can create a magnetic effect and relate the shape and direction of the magnetic field around a long straight conductor to the direction of the current. - Explain how inside a solenoid (an example of an electromagnet) the fields from individual coils a add together to form a very strong almost uniform field along the centre of the solenoid b cancel to give a weaker field outside the solenoid. - Explain why, in the national grid, electrical energy is transferred at high voltages from power stations, and then transferred at

		- Describe, with examples, the relationship between the power ratings for domestic electrical appliances and the changes in stored energy when they are in use.	lower voltages in each locality for domestic uses as it improves the efficiency by reducing heat loss in transmission lines. - Explain where and why step-up and step-down transformers are used in the transmission of electricity in the national grid. - Be able to use the power equation (for transformers with100% efficiency): potential difference across primary coil (volt, V) × current in primary coil (ampere, A) = potential difference across secondary coil (volt, V) × current in secondary coil (ampere, A).
Assessment Overview	End of half term test. 45mins long foundation or higher version available. Paper 1 mock exam.	End of half term test. 45mins long foundation or higher version available.	End of half term test. 45mins long foundation or higher version available. Paper 2 mock exam.

	Spring Term 2 Mocks SP7(Triple Only) SB8 & SB9 (Triple Only) SC14 (Triple Only)	Summer Term 1 SP11 (Triple Only) SC22-24(Triple Only) SP14/15 (Triple Only) SC25 (Triple Only)	Summer Term 2
Overview of Scheme of Learning	**<u>Mocks</u>** Paper 2 for Biology, Chemistry and Physics. <u>SP7</u> - Recall that our Solar System consists of the Sun (our star), eight planets and their natural satellites (such as our moon); dwarf planets; asteroids and comets - Describe how methods of observing the Universe have changed over time including why some telescopes are located outside the Earth's atmosphere - Describe how ideas about the structure of the Solar System have changed over time - Describe the orbits of moons, planets, comets and artificial satellites - Explain for circular orbits how the force of gravity can lead to changing velocity of a planet but unchanged speed - Describe the evolution of stars of similar mass to the Sun through the following stages: a) nebula b) star (main sequence) c) red giant d) white dwarf	<u>SP11</u> - Explain how an insulator can be charged by friction, through the transfer of electrons - Explain how the material gaining electrons becomes negatively charged and the material losing electrons is left with an equal positive charge - Explain common electrostatic phenomena in terms of movement of electrons, including: a) shocks from everyday objects b) lightning c) attraction by induction such as a charged balloon attracted to a wall and a charged comb picking up small pieces of paper - Explain some of the uses of electrostatic charges in everyday situations, including insecticide sprayers - Describe some of the dangers of sparking in everyday situations, including fuelling cars, and explain the use of earthing to prevent dangerous build-up of charge - Describe the shape and direction of the electric field around a point charge and between parallel plates and relate the strength of the field to the concentration of lines	EXAMS

	- Describe the evolution of stars with a mass larger than the Sun - Describe the red-shift in light received from galaxies at different distances away from the Earth - Explain why the red-shift of galaxies provides evidence for the Universe expanding - Compare the Steady State and Big Bang theories. Describe evidence supporting the Big Bang theory, limited to red-shift and the cosmic microwave background (CMB) radiation <u>SB8</u> - Describe the factors affecting the rate of diffusion, including surface area, concentration gradient and diffusion distance - Calculate the rate of diffusion using Fick's law: rate of diffusion ∝ (surface area × concentration difference) / thickness of membrane <u>SB9</u> - Evaluate the use of indicator species as evidence to assess the level of pollution, including: a) polluted water – bloodworm, sludgeworm b) clean water – freshwater shrimps, stonefly c) air quality – different species of lichen, blackspot fungus on roses - Explain the effects of temperature, water content and oxygen availability on the rate of decomposition in food preservation	<u>SP14/15</u> - Explain the pressure of a gas in terms of the motion of its particles - Explain the effect of changing the temperature of a gas on the velocity of its particles and hence on the pressure produced by a fixed mass of gas at constant volume (qualitative only) - Describe the term absolute zero, −273 °C, in terms of the lack of movement of particles - Convert between the kelvin and Celsius scales - Explain the effect of changing the volume of a gas on the rate at which its particles collide with the walls of its container and hence on the pressure produced by a fixed mass of gas at constant temperature - Use the equation: $P_1 V_1 = P_2 V_2$ to calculate pressure or volume for gases of fixed mass at constant temperature - Explain why doing work on a gas can increase its temperature, including a bicycle pump - Explain why atmospheric pressure varies with height above the Earth's surface with reference to a simple model of the Earth's atmosphere - Explain why the pressure in liquids varies with density and depth - Use the equation to calculate the magnitude of the pressure in liquids and calculate the differences in	

	- Explain the effects of temperature, water content and oxygen availability on the rate of decomposition in composting - Calculate rate changes in the decay of biological material <u>SC14</u> - Calculate the percentage yield of a reaction from the actual yield and the theoretical yield - Describe that the actual yield of a reaction is usually less than the theoretical yield and that the causes of this include: a) incomplete reactions b) practical losses during the experiment c) competing, unwanted reactions (side reactions) - Calculate the atom economy of a reaction forming a desired product - Explain why a particular reaction pathway is chosen to produce a specified product, given appropriate data such as atom economy, yield, rate, equilibrium position and usefulness of by-products - Calculate the concentration of solutions in mol dm^{-3} and convert concentration in g dm^{-3} into mol dm^{-3} and vice versa - Carry out simple calculations using the results of titrations to calculate an unknown concentration of a solution or an unknown volume of solution required - *Required practical*	pressure at different depths in a liquid: - pressure due to a column of liquid (pascal, Pa) = height of column (metre, m) × density of liquid (kilograms per cubic metre, kg/m3) × gravitational field strength (newton per kilogram, N/kg) - $P = h \times \rho \times g$ - Explain why an object in a fluid is subject to an upwards force (upthrust) and relate this to examples including objects that are fully immersed in a fluid (liquid or gas) or partially immersed in a liquid - Recall that the upthrust is equal to the weight of fluid displaced - Explain how the factors (upthrust, weight, density of fluid) influence whether an object will float or sink <u>SC22-24</u> - Explain why the alkanes are saturated hydrocarbons - Recall the formulae of molecules of the alkenes, ethene, propene, butene and draw the structures of these molecules, showing all covalent bonds (but-1-ene and but-2-ene only) - Explain why the alkenes are unsaturated hydrocarbons, describing that their molecules contain the functional group C=C - Recall the addition reaction of ethene with bromine, showing the structures of reactants and products, and extend this to other alkenes	

	- Describe the molar volume, of any gas at room temperature and pressure, as the volume occupied by one mole of molecules of any gas at room temperature and pressure (The molar volume will be provided as 24 dm^3 or 24000 cm^3 in calculations where it is required) - Use the molar volume and balanced equations in calculations involving the masses of solids and volumes of gases - Use Avogadro's law to calculate volumes of gases involved in a gaseous reaction, given the relevant equation <u>Combined Science</u> - Revision of Paper 1 topics: - B1 - B2 - B3 - B4 - B5 - C1 - C2 - C3 - C4 - C5 - C6 - C7 - C8 - C9 - C10 - C11	- Explain how bromine water is used to distinguish between alkanes and alkenes - Describe how the complete combustion of alkanes and alkenes involves the oxidation of the hydrocarbons to produce carbon dioxide and water - Describe the production of ethanol by fermentation of carbohydrates in aqueous solution, using yeast to provide enzymes - Explain how to obtain a concentrated solution of ethanol by fractional distillation of the fermentation mixture - Recall the formulae of molecules of the alcohols, methanol, ethanol, propanol (propan-1-ol only) and butanol (butan-1-ol only), and draw the structures of these molecules, showing all covalent bonds - Recall that the functional group in alcohols is –OH - Recall members of a given homologous series have similar reactions because their molecules contain the same functional group and use this to predict the products of other members of these series - Required Practical - Recall the formulae of molecules of the carboxylic acids, methanoic, ethanoic, propanoic and butanoic acids, and draw the structures of these molecules, showing all covalent bonds	

	- C12 - P1 - P2 - P3 - P4 - P5 - P6	- Recall that the functional group in carboxylic acids is –COOH - Recall that ethanol can be oxidised to produce ethanoic acid and extend this to other alcohols - Recall that a polymer is a substance of high average relative molecular mass made up of small repeating units - Recall that: a) DNA is a polymer made from four different monomers called nucleotides (names of nucleotides not required) b) starch is a polymer based on sugars c) proteins are polymers based on amino acids - Describe: a) how ethene molecules can combine together in a polymerisation reaction b) that the addition polymer formed is called poly(ethene) - (conditions and mechanisms not required) - Describe how other addition polymers can be made by combining together other monomer molecules containing C=C, to include poly(propene), poly(chloroethene) (PVC) and poly(tetrafluoroethene) (PTFE) (conditions and mechanisms not required) - Explain how the uses of polymers are related to their properties and vice versa: including poly(ethene), poly(propene), poly(chloroethene) (PVC) and poly(tetrafluoroethene) (PTFE) - Explain: a) why polyesters are condensation polymers	

		b) how a polyester is formed when a monomer molecule containing two carboxylic acid groups is reacted with a monomer molecule containing two alcohol groups c) how a molecule of water is formed each time an ester link is formed - Evaluate the advantages and disadvantages of recycling polymers, including economic implications, availability of starting materials and environmental impact <u>SC25</u> - Explain why the test for any ion must be unique - Describe that instrumental methods of analysis are available and that these may improve sensitivity, accuracy and speed of tests - Evaluate data from a flame photometer: a) to determine the concentration of ions in dilute solution using a calibration curve b) to identify metal ions by comparing the data with reference data - Explain why the test for any ion must be unique - Describe flame tests to identify the following ions in solids: a) lithium ion, Li^+ (red) b) sodium ion, Na^+ (yellow) c) potassium ion, K^+ (lilac) d) calcium ion, Ca^{2+} (orange-red) e) copper ion, Cu^{2+} (blue-green) - Describe tests to identify the following ions in solids or solutions as	

		appropriate: a) aluminium ion, Al^{3+} b) calcium ion, Ca^{2+} c) copper ion, Cu^{2+} d) iron(II) ion, Fe^{2+} e) iron(III) ion, Fe^{3+} - Identify the ions in unknown salts, using results of the tests above - Describe tests to identify the following ions in solids or solutions as appropriate: a) carbonate ion, CO_3^{2-} using dilute acid and identifying the carbon dioxide evolved b) sulfate ion, SO_4^{2-} using dilute hydrochloric acid and barium chloride solution c) chloride ion, Cl^-, bromide ion, Br^-, iodide ion, I^-, using dilute nitric acid and silver nitrate solution - Identify the ions in unknown salts, using results of the tests above - Required Practical <u>Combined Science</u> - Paper 2 Revision of topics: - B7 - B8 - B9 - C13 - C14 - C15 - C16 - C17 - P7	

		- P8 - P9 - P10 - P11 - P12 - P13	
Assessment Overview			