Science Curriculum Intent

At the Kingsway School, we believe that the study of science is important because science allows us to develop new technologies, solve practical problems, and make informed decisions

The foundations of science are built on an understanding of:

- cells and systems, plants and the environment, and variation and inheritance in biology
- particles and matter, chemical reactions, and earth and atmosphere in chemistry
- forces and motion, energy, and waves in physics.

The core knowledge is science is both deep and broad, it more than covers the national curriculum. They will apply this when completing practical science safely, collecting data, making predictions, drawing conclusions, applying concepts and ideas in different contexts or when they draw links across different years and subjects.

Our classrooms support our learners to achieve by fostering high academic aspiration, nurturing curiosity, and encouraging critical thinking.

As part of the science curriculum, learners are provided with a range of high quality academic texts with the aim of explicitly teaching scientific vocabulary, modelling fluent reading, encouraging reading of scientific articles, and encouraging a culture of reading.

We support pupils to be compassionate and keep each other safe by modelling safe and compassionate behaviours, explicitly teaching pupils how to stay safe in a science lab and how to keep others safe by reducing risk.

Through the science curriculum will run a golden thread of wellbeing where we teach the pupils about their body and how to stay safe, that could be reproduction and relationship, disease or drugs.

During their time in science the pupils will collect and reflect on experimental data; they analyse, interpret and evaluate. By doing this, we encourage our students to think critically, morally and ethically about science, understand the world that they live in, and to develop skills that will support them for their futures.

Our curriculum creates young people who have a deep understanding of the world around them, are compassionate, can keep themselves safe, hold themselves to a high moral standard, respect and celebrate differences and can engage with big issues in our society.

Subject: **Year 10 Science**

Our GCSE Science curriculum is designed to inspire curiosity and ambition while helping every student build a strong understanding of the world around them. Bringing together **biology, chemistry, and physics**, it develops the knowledge, practical skills, and critical thinking needed for success in further study and future STEM careers.

Students explore how living things function and interact, how substances behave and react, and the fundamental forces and energy that shape the universe. Key topics include human biology and infection, atomic structure and chemical reactions, electricity and radioactivity, and the ethical impact of scientific advances.

We nurture **aspiration** by challenging students to think deeply, solve real-world problems, and develop the resilience to tackle demanding concepts with confidence.

Inclusion is at the heart of our teaching. Lessons are designed to be accessible to all learners, with differentiated strategies, tailored guidance, and additional support where needed to ensure every student can thrive, including those with SEND.

We foster **compassion** by exploring how science can help address global challenges such as climate change, healthcare, biodiversity, and sustainable development. Students are encouraged to consider how their learning can make a positive difference in their communities and the wider world.

By the end of the course, students will leave with a strong foundation in science, the confidence to pursue ambitious goals, and the values of **aspiration, compassion, and inclusion** to guide them both academically and personally.

	Year 10, Term 1 B2 Organisation	**Year 10, Term 1, Chemistry** C2 Chemical bonding, structure and properties.	**Year 10, Term 1, Physics** P3: Particle Model of Matter
Acquire	Recall the terms definition of cell, tissue, organ, organ system and organism, and be able to give examples of each. State the order of size and scale of cells, tissues, organs, organ systems and organisms.. Describe the functions of the digestive system. Identify the positions of the main organs on a diagram of the digestive system. Recall that food molecules must be small and soluble in order to be absorbed into the blood. Describe the functions of the organs in the system. Define the terms 'catalyst' and 'enzyme'. Describe the properties of enzymes. Explain why foods need to be digested into small, soluble molecules. Describe the three types of enzymes involved in digestion, including the names of the substrates, products and where the enzymes are produced.	• Define Ionic bonding • Define Covalent bonding • Define Metallic bonding • Recognise for ionic bonding the particles are oppositely charged ions. • Recognise for covalent bonding the particles are atoms which share pairs of electrons. • Recognise in metallic bonding the particles are atoms which share delocalised electrons. • State that bIonic bonding occurs in compounds formed from metals combined with non-metals. • State that Covalent bonding occurs in non-metallic elements and in compounds of non-metals. • State that Metallic bonding occurs in metallic elements and alloys. • Identify chemical bonding in terms of electrostatic forces and the transfer or sharing of electrons. • Identify when a metal atom reacts with a non-metal atom, electrons in the outer shell of the metal atom are transferred. • state metal atoms lose electrons to become positively charged ions. • State Non-metal atoms gain electrons to become negatively charged ions • Recall the ions produced by metals in Groups 1 and 2	• Recall the equation that links: density, mass, and volume • Recall the units for density, mass, volume, energy changes, specific heat capacity, temperature change, latent heat, pressure • Recall the three states of matter • Draw simple diagram to represent the three state of matter • Describe the particle arrangement and particle movement in each state of matter • Describe how density changes when changing state • State the law of conservation of mass in relation to changing state • Name the changes of state • Describe how the forces between particles and energy of particle changes during changes of state • Define internal energy • Apply the equation for specific heat capacity • Define specific heat capacity • Define latent heat, latent heat of fusion, and latent heat of vaporisation • Apply the latent heat equation • State how particles in a gas move

	Describe the functions of the heart and circulatory system. Describe and label a diagram of the heart showing four chambers, vena cava, pulmonary artery, pulmonary vein and aorta. Describe the flow of blood from the body, through the heart and lungs and back to the body. Explain how the heart is adapted for its function. Describe the heart as a double pump and explain why this is efficient. Label the main structures in the gas exchange system – trachea, bronchi, alveoli and capillary network around alveoli. Recall the three blood vessels. Recall the four main components of blood. Identify pictures of the different blood cells. Recall examples of communicable and non-communicable diseases. Give risk factors associated with cardiovascular disease, Type 2 diabetes, lung diseases and cancers. Describe some causes of cancer, eg viruses, smoking, alcohol, carcinogens and ionising radiation. Recall the definition of cancer. Label the main organs of a plant and describe their functions. Identify the tissues in a leaf and describe their functions.	• Recall the ions produced by Groups 6 and 7. • Draw dot and cross diagrams for ionic compounds formed by metals in Groups 1 and 2 with non-metals in Groups 6 and 7 • State how electrons transfer during the formation of an ionic compound. • State how ionic compounds are held together by strong electrostatic forces of attraction between oppositely charged ions. • Know that forces act in all directions • Know that an ionic compound is a giant structure in the lattice. • Know when atoms share pairs of electrons, they form covalent bonds. • State these bonds between atoms are strong. • Know that covalently bonded substances may consist of small molecules. • Know that some covalently bonded substances have very large molecules, such as polymers. • Know that some covalently bonded substances have giant covalent structures, • State that diamond, graphite and silicon dioxide are giant structures. • Recognise substances as small molecules, polymers or giant structures from diagrams showing their bonding. • recognise common substances that consist of small molecules from their chemical formula. • Recognize that graphite forms layers of hexagonal rings which have no covalent bonds between the layers. • Know that in graphite, one electron from each carbon atom is delocalised. • Identify that graphene is a single layer of graphite • Know that Graphene has properties that make it useful in electronics and composites.	• Relate the temperature, pressure and volume of a gas • Apply the equation for gas pV=const (Triple only) • State how work done on a gas affects pressure / temperature (Triple only)

	Recall the organs that make up the plant transport system. Recall the role of xylem; phloem and root hair cells. Define the terms 'transpiration' and 'translocation'. Define the term 'active transport'.	● Know that fullerenes are molecules of carbon atoms with hollow shapes.	
Apply	Explain how the small intestine is adapted for its function. Explain why enzymes are specific and are denatured by high temperatures and extremes of pH. Explain how bile helps in the digestion of fats. Describe the function of the pacemaker cells and coronary arteries. Explain how the alveoli are adapted for efficient gas exchange. Describe problems associated with the heart and explain how they can be treated. Evaluate the use of drugs, mechanical devices and transplants to treat heart problems, including religious and ethical issues. Explain how the blood vessels are adapted for their function. Explain how each component is adapted for its function. Explain how diet, stress and life situations can affect physical and mental health. Describe examples of how diseases may interact.	● Work out the charge on the ions of metals and non-metals from the group number of the element ● Limited to the metals in Groups 1 and 2, and non-metals in Groups 6 and 7. ● Deduce that a compound is ionic from a diagram of its structure in one of the specified forms ● Describe the limitations of using dot and cross, ball and stick, two and three dimensional diagrams to represent molecules or giant structures ● Explain intermolecular forces are weak compared with covalent bonds to explain the bulk properties of molecular substances. ● Recognise graphene and fullerenes from diagrams and descriptions of their bonding and structure. ● Explain the properties of graphite in terms of its structure and bonding. ● Know that graphite is similar to metals in that it has delocalised electrons. ● Explain the properties of diamond in terms of its structure and bonding. ● Know that the side of the cube decreases by a factor of 10 the surface area to volume ratio increases by a factor of 10. ● Be able to translate data between diagrammatic and numeric forms. ● Describe the limitations of using dot and cross, ball and stick, two and three dimensional diagrams to represent a giant ionic structure ● State and describe limitations of the particle model	● Use an equation to find an unknown variable ● Write methods for experiments. ● Accurately plot axes & graphs ● Draw lines of best fit and use them to find tangents and gradients

	Describe the effects of diet, smoking, alcohol and exercise on health. Explain how and why the Government encourages people to lead a healthy lifestyle. Describe the difference between benign and malignant tumours. Explain why there are more stomata on the lower surface of a leaf. Describe the role of stomata and guard cells to control water loss and gas exchange. Relate the structure of each tissue in a plant to its function in photosynthesis. Describe the role of xylem, phloem and root hair cells and explain how they are adapted for their functions. Describe where active transport occurs in humans and plants and what is transported. Explain why active transport requires energy.	• Work out the empirical formula of an ionic compound from a given model or diagram that shows the ions in the structure.	
Vocabulary	Benign tumour Bile Blood Cancer Enzymes Health Malignant tumour Meristem tissue Non-communicable disease	Ionic covalent metallic electrons diamond graphite melting point boiling point bonds structure properties delocalised particle model conduction	• boiling point • Boyle's Law • density • freezing point • internal energy • latent heat • melting point • physical change • pressure • specific latent heat of fusion L_f • specific latent heat of vaporisation L_v

	Organ systems Risk factor Translocation Transpiration	tetrahedral layers intermolecular	
Assessment	Blue Sheet Assessment for B2 and end of topic test.	Blue Sheet Assessment for C2 and end of topic test.	Blue Sheet Assessment P3 - Particle model of matter End of topic test P3 - Particle model of matter
		Year 10, Term 1/2, Chemistry C3 Quantitative chemistry.	**Year 10, Term 1, Physics** P4: Atomic Structure
Acquire		• Write simple word equations. • Write simple symbol equations. • Balance symbol equations. • Describe the equations given in terms of number of moles, reactants and products • .Review the definition of relative atomic mass. • Recall how to find the relative atomic mass from the Periodic Table. • Define the relative molecular mass. • Be able to calculate the relative formula mass (M_r) of a compound from its formula, given the relative atomic masses • Know that whenever a measurement is made there is always some uncertainty about the result obtained. • Represent the distribution of results and make estimations of uncertainty. • Use the range of a set of measurements about the mean as a measure of uncertainty • Understand that the measurement of amounts in moles can apply to atoms, molecules, ions, electrons, formulae and equations. • Know for example that in one mole of carbon (C) the number of atoms is the same as the number of molecules in one mole of carbon dioxide (CO_2).	• State the approximate radius of an atom • State the approximate size of the nucleus compared to the size of an atom • Name the three subatomic particles • State the relative charge and relative mass of the three subatomic particles • Simply describe the location of the three subatomic particles. • State what is meant by mass number and atomic number • Define isotope • Name historic models of the atoms in chronological order • Describe different models of the atom • State the evidence used for changing between atomic models. • Name the three types of nuclear radiation. • State what the different types of nuclear decay are made of. • Name the unit for radioactivity • Define count-rate and activity • Know that radioactive decay is random • State the penetrating power & ionising power of the different types of nuclear decay

		• Understand that the number of atoms, molecules or ions in a mole of a given substance is the Avogadro constant. The value of the Avogadro constant is 6.02 x 10^{23} per mole. • Define one mole in terms of M_r and A_r • Calculate the number of moles in a substance using the relative formula mass. • Define the term limiting reactant. • Link the limiting reactant to the number of moles. • Link the limiting reactant to the masses in grams. • Calculate the volume of a gas at room temperature and pressure from its mass and relative formula mass • Calculate volumes of gaseous reactants and products from a balanced equation and a given volume of a gaseous reactant or product.	• Name the equipment used to detect radioactive decay • Give uses of nuclear radiation • Complete decay equation • State what happens in the nucleus of an atom that undergoes radioactive decay • Define half-life • Define radioactive contamination • Define irradiation • Describe the precautions taken to stay safe in the presence of nuclear radiation • Define background radiation (triple only) • Give examples of background radiation (triple only) • Define nuclear fission (triple only) • Draw a diagram to represent a nuclear fission chain reaction (triple only) • State the role of control rods in a chain reaction (triple only) • Define nuclear fusion
Apply		• Explain any observed changes in mass in non-enclosed systems during a chemical reaction. • Use the balanced symbol equation for a reaction to recognise changes in terms of the particle model • use measurements of mass before and after an experiment to explain what has happened to the mass during the experiment and why it has happened. • Deduce the molecular formula of a substance from a given model or diagram. • Calculate the mass of solute in a given volume of solution of known concentration in terms of mass per given volume of solution. • convert cm^3 into dm^3. • Use the equation: $C = m / v$ to calculate the concentration of a solution.	• Use mass number and atomic number to state the number of subatomic particles in an atom. • Complete decay equations • Determine the half-life of a radioactive source • Calculate net decline as a ratio (higher tier only)

		• Calculate the percentage yield of a product from the actual yield of a reaction. • Describe how atoms are lost or gained in a chemical reaction. • Explain why atoms can be lost or gained in a chemical reaction. • Calculate the theoretical yield for simple examples • Calculate the atom economy for simple examples. • Explain the meaning of concentration and the unit mol per dm^3. • Be able to convert cm^3 into dm^3. • Use the equation $C = n / v$ to calculate the concentration of a solution. • • Including reasons for using a burette instead of other measuring equipment. • Recall the equation: $number\ of\ moles = \frac{mass}{relative\ formula\ mass}$ • Use the equation: volume of gas at rtp = number of moles x molar gas volume (24 dm^3) for simple examples. • Balance complex equations and add state symbols. • Balance chemical equations and use these to calculate the masses of substances present. • Be able to balance an equation given the masses of reactants and products. • Change the subject of a mathematical equation. • Explain the effect of a limiting quantity of a reactant on the amount of products it is possible to obtain in terms of amounts in moles or masses in grams. • Calculate the theoretical amount of a product from a given amount of reactant	

		and the balanced equation for the reaction. ● Calculate the atom economy of a reaction to form a desired product from the balanced equation. ● Explain why a particular reaction pathway is chosen to produce a specified product given appropriate data such as atom economy (if not calculated), yield, rate, equilibrium position and usefulness of by-products. ● Use balanced equations and known volume of reactant/product to calculate the volumes of gaseous reactants/ products.	
Vocabulary		conservation mass measure thermal decomposition mass number isotopes balanced formula uncertainty mean range tolerance moles Avogadro reacting mass yield atom economy molar mass	● activity ● alpha radiation (α) ● atomic number ● beta radiation (β) ● chain reaction ● count rate ● gamma radiation (γ) ● half-life ● ionisation ● irradiated ● isotopes ● mass number ● moderator ● nuclear fission ● nuclear fusion ● radioactive contamination ● reactor core
Assessment		Blue Sheet Assessment for C3 and end of topic test.	Blue Sheet Assessment P4: Atomic Structure End of topic test P4: Atomic Structure
	Year 10, Term 2 B3 Infection and Response	**Year 10, Term 2, Chemistry** C4 Chemical Changes.	**Year 10, Term 2, Physics** P2: Electricity

Acquire	Recall the term pathogen and state the four main groups of pathogen. Recall how pathogens can be spread to plants or animals and cause infection. Recall how the spread of disease can be reduced or prevented. Recall the safety precautions you must take when growing microorganisms. Recall safety precautions for microbial investigations. Recall the optimum conditions for bacterial growth. Recall the symptoms, mode of transmission, prevention and treatment for measles, HIV and AIDS, salmonella and gonorrhoea. Describe colds and flu as viral diseases. Describe athlete's foot as a fungal disease. Describe the body's first line defences. Describe what white blood cells do. Describe what a vaccine contains. Give examples of painkillers and other medicines used to treat symptoms. Explain why drugs need to be tested before they can be prescribed.	• Define the following terms: oxidation reduction. • Write word and balanced symbol equations for the reactions of metals with oxygen to produce metal oxides. • identify where reduction and oxidation has taken place. • Recall and describe the reactions, if any, of potassium, sodium, lithium, calcium, magnesium, zinc, iron and copper with water or dilute acids, where appropriate, to place these metals in order of reactivity. • State why metals such as gold are found in the Earth as the metal itself but most metals are found as compounds that require chemical reactions to extract the metal. • know why Metals less reactive than carbon can be extracted from their oxides by reduction with carbon. • Know Reduction involves the loss of oxygen • Identify the substances which are oxidised or reduced in terms of gain or loss of oxygen • Know that Oxidation is the loss of electrons and reduction is the gain of electrons. • Know that acids react with some metals to produce salts and hydrogen. • Define the term neutralisation. • Know that acids are neutralised by alkalis. • Know that acids and bases (metal oxides) produce salts and water • Know that metal carbonates and acid produce salts, water and carbon dioxide. • Know that metals reacting with acid produce hydrogen and salts • Know that the salt produced in any reaction between an acid and a base or alkali depends on:the acid used • Know that hydrochloric acid produces chlorides • Know that Nitric acid produces nitrates	• Recall the units for: current, charge, time, resistance, potential difference, power • Name and draw circuit symbols • Define electrical current • Recall the equation that links: charge, current and time • State Ohm's law • Recall the Ohm's law equation • Recognise the V-I graph for a fixed value resistor, filament lamp, diode, thermistor & LDR. • State how the resistance of thermistors and LDRs change with change in the environment • State the difference between a series and parallel circuit • State the rules for current, potential difference and resistance in both series and parallel circuits. • State the frequency and potential of the UK domestic supply • State what is meant by both direct and alternating potential differences. • State the colour of the insulation in a three pin plug • State the names of the pins in a three pin plug • State the role of each wire / component in a three pin plug. • State the expected potential difference between the live and neutral wires in a three pin plug. • Recall the equation that links: power, current, and potential difference • Recall the equation that links: power, current, and resistance • Recall the equation that links: power, energy, and time

	Recall which drugs come from plants and microorganisms. Explain the terms placebo and double-blind trial. Triple Science Biology Only: Recall what MABs are. Recall the uses of MABs. Explain why MABs are not yet widely used in the body. Recall the symptoms and effects of Tobacco mosaic virus and its effects. Recall the symptoms and effects of Rose black spot fungal infection Recall methods that gardeners and scientists can use to identify the disease causing pathogen. Recall the physical and chemical ways plants can resist microorganisms. Recall mechanical adaptations to deter animals.	• Know that sulfuric acid produces sulfates • Define the terms: soluble insoluble. • Explain what is meant by a soluble salt. • Explain why reactants are often used in excess. • Know that salt solutions can be crystallised to produce solid salts. • Define the following terms: acid base alkali neutral. • Recall the pH numbers for the following solutions: acidic alkaline neutral. • Describe the use of universal indicator or a wide range indicator to measure the approximate pH of a solution. • Use the pH scale to identify acidic or alkaline solutions. • State that Acids produce hydrogen ions (H^+) in aqueous solutions. • State aqueous solutions of alkalis contain hydroxide ions (OH^-). • Know that In neutralisation reactions between an acid and an alkali, hydrogen ions react with hydroxide ions to produce water. • Know this reaction can be represented by the equation: $H^+ (aq) + OH^- (aq) \rightarrow H_2O (l)$ • Use and explain the terms dilute and concentrated (in terms of amount of substance), and • Use the terms weak and strong (in terms of the degree of ionisation) in relation to acids.	• Recall the equation that links: charge, energy, and potential difference • State the components of the National Grid • State how step-up and step-down transformers affect potential difference and current. • State that objects become charged because of the transfer of electrons (Triple only) • State that electrons have a negative electrical charge (Triple only) • Know that like charges repel and unlike charges attract (triple only)

		• Explain the meaning of the following terms: dilute concentrated weak strong. • Recall examples of strong and weak acids. • Describe neutrality in terms on hydrogen ion concentration. • Describe relative acidity in terms of hydrogen ion concentration. • Define the term electrolyte. • Describe how an electric current can pass through an ionic compound. • Know why solid ionic compounds cannot conduct electricity. • Know why ionic compounds can conduct electricity when melted or dissolved in water. • Predict the products of the electrolysis of binary ionic compounds in the molten state • Recall the reactivity series. • Give reasons why some metals have to be extracted by electrolysis. • Know Aluminium is manufactured by the electrolysis of a molten mixture of aluminium oxide and cryolite • Know that carbon is used for positive electrode (anode). • Know how aluminium is extracted from its ore. • Write balanced half equations for the reactions that occur at both electrodes for aluminium extraction • State why a mixture is used as the electrolyte. • State why the positive electrode must be continually replaced. • Define the term aqueous. • Know how an aqueous solution is electrolysed.	

		• Know that at the negative electrode (cathode), hydrogen is produced if the metal is more reactive than hydrogen • Know that at the positive electrode (anode), oxygen is produced unless the solution contains halide ions when the halogen is produced. • Know that in the aqueous solution water molecules break down. • Know that hydrogen ions and hydroxide ions are discharged from this breakdown • Know that the cathode is the negative electrode • Know that positively charged ions gain electrons at the cathode. • Know that reduction takes place at the cathode • Know the anode is the positive electrode • Know that negatively charged ions lose electrons at the anode. • Know that oxidation takes place at the anode • Know that oxidation is loss of electrons • Know that reduction is gain of electrons.	
Apply	Recognise bacterial and fungal colonies growing on agar plates. Describe the main differences between bacteria and viruses. Explain why cultures are incubated at a maximum temperature of 25ºC in schools. Describe the life cycle of the malarial protist Describe the symptoms, mode of transmission, prevention and treatment for malaria. Explain how microbes make us feel ill and how viruses damage cells.	• Draw the atomic structure of metals and the ion formed. Use these to describe how the ion has been formed. • Explain reduction and oxidation in terms of loss or gain of oxygen • Make links between the ability to form ions and the reactivity with water and acid. • Explain the trends in reactivity of Group 1 in terms of atomic structure. • Describe what occurs in a displacement reaction, using suitable examples. • Deduce an order of reactivity of metals based on experimental results. • Write ionic equations for displacement reactions.	• Use an equation to find an unknown variable • Write methods for experiments. • Accurately plot axes & graphs • Draw lines of best fit and use them to find tangents and gradients.

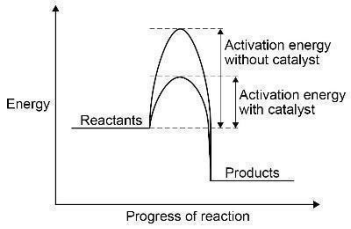
	Explain why antibodies are specific for one pathogen/ antigen. Explain how vaccines prevent disease. Describe the problems associated with antibiotic resistance. Describe Fleming's discovery and explain its importance. Explain how antibiotics treat only bacterial diseases and how this has saved lives. Explain the difficulty in developing drugs that kill viruses without damaging body tissues. Describe the main steps in the development and testing of a new drug. Give reasons for the different stages in drug testing. Biology only: Describe how MABs are produced. Describe how the uses of MABs work with given information. Evaluate the advantages and disadvantages of MABs. Explain how aphids affect plant growth. Describe visual indications of plant disease, as described in the specification.	● Identify in a given reaction, symbol equation or half equation which species are oxidised and which are reduced. ● Explain in terms of gain or loss of electrons, that these are redox reactions. ● Identify which species are oxidised and which are reduced in given chemical equations. ● Predict products from given reactants. ● Use the formulae of common ions to deduce the formulae of salts. ● Describe how to make pure, dry samples of named soluble salts from information provided. ● Describe how to carry out titrations using strong acids and strong alkalis only (sulfuric, hydrochloric and nitric acids only) to find the reacting volumes accurately. ● Calculate the chemical quantities in titrations involving concentrations in mol/dm^3 and in g/dm^3. ● Explain why strong acids are completely ionised in aqueous solutions but a weak acid is only partially ionised. ● Explain what happens to positive and negative ions during electrolysis and how elements form from their ions. ● Explain why the following atoms could be produced: hydrogen oxygen. ● Reactions at electrodes can be represented by half equations, for example: ● Explain how the reactivity of metals with water or dilute acids is related to the tendency of the metal to form its positive ion. ● Explain why displacement occurs. ● Describe how carbon is used to reduce metal oxides. Explain how this takes place in terms of movement of electrons. ● Identify which products have been oxidised in extraction examples. Explain	

		how this takes place in terms of movement of electrons ● Write balanced symbol equations/half equations for the displacement of metal oxides. Use these to identify which species has been oxidised or reduced. Give reasons for your answers. ● Write the symbol equation for the neutralisation of an acid and an alkali. ● Describe neutrality and relative acidity in terms of the effect on hydrogen ion concentration and the numerical value of pH ● Write half equations for the reactions occurring at the electrodes during electrolysis. ● Balance supplied half equations. ● Explain thoroughly what happens at the following electrodes using suitable examples and half equations: cathode anode	
Vocabulary	Pathogen Protist Virus Bacteria Fungus Communicable Vector Platelets Lymphocytes Antitoxins Phagocytes Antibodies Antibiotics Monoclonal Antibodies	acids alkalis neutralisation strong weak electrolysis pH ionise molten oxidation displacement reactivity series extraction half equation	● diode ● electric field ● ion ● light-depending resistor (LDR) ● light-emitting diode (LED) ● Ohm's law ● parallel ● potential difference ● resistance ● series ● static electricity ● thermistor ● alternating current (a.c.) ● direct current (d.c.) ● earth wire ● fuse ● live wire ● neutral wire

			• oscilloscope • step-down transformers • step-up transformers • three-pin plug
Assessment	Blue Sheet Assessment for B3 and end of topic test.	Blue Sheet Assessment for C4 and end of topic test.	Blue Sheet Assessment P2: Electricity End of topic test P2: Electricity
	Year 10, Term 3 B7 Ecology	**Year 10, Term 3, Chemistry** C6 Rates of reaction and equilibrium.	**Year 10, Term 3, Physics** P6: Waves
Acquire	• Define the terms ecosystem, community, competition, habitat, interdependence. • Describe factors that affect the survival of organisms in their habitat. • Define a stable community. • Recall an example of a stable community. • Recall resources that plants and animals compete for in a given habitat. • Recall structural, behavioural and functional adaptations, in a range of organisms. • Define the term extremophile and give general examples. • Identify producers, primary, secondary and tertiary consumers in a food chain. • Classify organisms based on their similarities. • Recall the Linnaean classification system. • Use the binomial system to name organisms. • Explain how modern technologies have affected how organisms are classified today.	Declarative Knowledge: • Calculate the mean rate of a reaction from given information about the quantity of a reactant used or the quantity of a product formed and the time taken. • Draw and interpret graphs showing the quantity of product formed or quantity of reactant used up against time. • Use graphical data to explain each part of the graph ie: initially rate is fast slows down reaction completes. • Explain what is meant by the units: g/s cm^3/s mol/s. • Know the Factors which affect the rates of chemical reactions including ○ The concentrations of reactants in solution ○ The pressure of reacting gases, ○ The surface area of solid reactants ○ The temperature of reactants ○ The presence of a catalyst. • recall how changing these factors affects the rate of chemical reactions. • Predict and explain using collision theory the effects of changing conditions of concentration, pressure and temperature on the rate of a reaction. • Predict and explain the effects of changes in the size of pieces of a reacting solid in terms of surface area to volume ratio.	• Recall the units of: wave speed, frequency, wavelength, period • Recognise, define and label transverse and longitudinal waves. • Define terms: ‘frequency’, ‘wavelength’ & ‘amplitude’. • Recall and use the wave equation and period-frequency equations. • Describe how to measure the speed of sound in air • Recognise that waves can be reflected, transmitted and absorbed at the boundary of different materials (triple only) • Describe the effect of reflection, transmission or absorption of waves at a boundary (triple only) • Know how sound waves travel (triple only) • Describe how the structure of the ear restricts the human range of hearing (triple only) • State the range of human hearing (triple only) • Define ultrasound (triple only) • State the properties of different seismic waves (triple only) • Describe how echo-sounding is used to measure depth (triple only) • Define ‘electromagnetic wave’

	• Recall Carl Woese's system of classification and classify organisms into the three domains. • Recall biotic factors in a habitat. • Recall abiotic factors in a habitat. • Explain how a change in a biotic factor might affect a community. • Recall how to carry out random sampling of organisms using a quadrat. • Recall when and how a transect should be used. • Recall the parts of the carbon, water and decay cycle. • Define biodiversity • Recall examples of the reduction in biodiversity. • Recall the types of water pollution. • Recall examples of air pollutants and where they come from. • Recall the effects of smoke on buildings, humans and plant photosynthesis. • Recall how acid rain is formed and the effects of acid rain on living organisms. • Recall what herbicides and pesticides are used for. • Recall what peat is and why it is important to preserve areas of peat.	• Use simple ideas about proportionality when using collision theory to explain the effect of a factor on the rate of a reaction. • Know what Collision theory is • Know how According to collision theory, chemical reactions can occur. • Recognise when reacting particles collide with each other and with sufficient energy a reaction is possible. • Know that the minimum amount of energy that particles must have to react is called the activation energy. • Recognise that increasing the concentration of reactants in solution, the pressure of reacting gases, and the surface area of solid reactants increases the frequency of collisions and so increases the rate of reaction. • Know that increasing the temperature increases the frequency of collisions and makes the collisions more energetic, and so increases the rate of reaction. • identify catalysts in reactions from their effect on the rate of reaction and because they are not included in the chemical equation for the reaction. • Explain catalytic action in terms of activation energy. • Define the term activation energy. • Identify advantages of using catalysts in industrial reactions eg reducing costs. • Know that enzymes act as catalysts in biological systems. • Know that catalysts increase the rate of reaction by providing a different pathway for the reaction that has lower activation energy. • Know that In some chemical reactions, the products of the reaction can react to produce the original reactants. • Know that reversible reactions are represented in the following way: $A + B \rightleftharpoons C + D$	• State the names of the wave in the electromagnetic spectrum in order (in terms of frequency and wavelength) • Describe how EM waves can be produced by changes in an atom • Define 'radiation dose' • Recall uses of EM waves • Recognise a concave and convex lens (triple only) • Understand the terms: principal focus, focal length, real image and virtual image. • Name the colours of the visible spectrum in order • Understand the terms: specular reflection & diffuse scattering (triple only) • Describe how colour filters work in terms of reflection & transmission (triple only) • Understand the colour of opaque object in terms of reflection & absorption (triple only) • Use the terms transparent, translucent and opaque appropriately (triple only) • Understand the term 'black body' and how wavelength and frequency of emission depends on temperature (triple only)

	• Recall why peat should not be burnt. • Recall the term deforestation. • Recall the terms greenhouse effect and global warming. • Recall the possible effects of global warming. • Recall measures to maintain biodiversity. • **Triple Science Biology Only** • Define the term biogas. • Recall the term factory farming and give examples of animals farmed in this way. • Recall why some fish stocks are declining and why this is a problem. • Recall ways that fish stocks can be conserved. • Recall how the fungus Fusarium can be grown to produce mycoprotein that can be eaten. • •	• Know that the direction of reversible reactions can be changed by changing the reaction conditions. • Know this type of arrow represents reversible reactions ⇌ • Recall definition of: exothermic endothermic. • Know that If a reversible reaction is exothermic in one direction, it is endothermic in the opposite direction.	
Apply	Explain how structural, behavioural and functional adaptations help an organism survive. Explain what a food chain shows. Explain that photosynthetic organisms are the producers of biomass for life on Earth. Calculate area, mean, median, mode and range. Explain why sample size is important to obtain valid results.	• Draw tangents to the curves on graphs and use the slope of the tangent as a measure of the rate of reaction. • Calculate the gradient of a tangent to the curve on these graphs as a measure of rate of reaction at a specific time. • Explain the effect on the rate of reaction of the following factors: concentration pressure surface area temperature catalyst.	• Write methods for experiments • Construct a ray diagram to show reflection (triple only) • Construct a ray diagram to show refraction at a boundary • Construct a ray diagram to show the images formed by concave and convex lenses (triple only) • Calculate magnification (triple only) • Write methods for experiments. • Accurately plot axes & graphs

	Interpret and explain population curves. Explain the carbon cycle Explain the water cycle Interpret graphs showing human population. Analyse and interpret data about water pollution. Analyse and interpret data about air pollution. Evaluate the use of fertiliser on plant growth and oxygen levels. Explain why vast tropical areas have been cleared of trees. Explain how deforestation increases the amount of carbon dioxide in the atmosphere and leads to a reduction in biodiversity. **Triple Science Biology only** Recall the factors which affect the rate of decay. Interpret data showing how factors affect the rate of decay. Describe how gardeners and farmers try to provide optimum conditions for rapid decay of wastes. Explain the difference between aerobic and anaerobic decay. Evaluate the use of biogas generators. Evaluate the necessity and effectiveness of recycling organic kitchen or garden wastes. Explain why the output from a biogas generator is affected by climatic conditions.	● A reaction profile for a catalysed reaction can be drawn in the following form:  ● Explain what is meant by a reversible reaction. ● Explain the difference between: reactions and reactions. ● Explain the term equilibrium ● Know how equilibrium is reached when the forward and reverse reactions occur at exactly the same rate ● Describe the effects of temperature on a reversible reaction ● Be able to interpret appropriate given data to predict the effect of a change in concentration of a reactant or product on given reactions at equilibrium. ● Use data to predict the effect of concentration on equilibrium. ● Interpret appropriate given data to predict the effect of a change in temperature on given reactions at equilibrium. ● Use data to predict the effect of temperature on equilibrium ● interpret appropriate given data to predict the effect of pressure changes on given reactions at equilibrium. ● Use data to predict the effect of pressure on equilibrium ● Use graphs of data obtained from concentration reactions to explain what occurs as the reaction proceeds	● Draw lines of best fit and use them to find tangents and gradients.

	Explain how factors affect food production and food security locally and globally. Interpret population and food production statistics to evaluate food security. Evaluate modern farming techniques. Describe how microorganisms can be grown in large vats to produce useful products. Explain how the conditions in the vat are monitored and controlled for optimal growth. Evaluate the use of mycoprotein as a food. Describe the process of genetic engineering to produce better crops. Describe what Golden rice is and how it was produced. Interpret information about genetic engineering techniques. Make informed judgements about the economic, social and ethical issues concerning genetic engineering.	• Be able to make qualitative predictions about the effect of changes on systems at equilibrium when given appropriate information • Describe Le Chatelier's principle. • Explain the effects on equilibrium of changing conditions using suitable examples. • Explain how the effects of changing conditions on a system at equilibrium can be predicted using Le Chatelier's Principle. • Explain if the temperature of a system at equilibrium is increased: the relative amount of products at equilibrium increases for an endothermic reaction the relative amount of products at equilibrium decreases for an exothermic reaction. • If the temperature of a system at equilibrium is decreased: the relative amount of products at equilibrium decreases for an endothermic reaction the relative amount of products at equilibrium increases for an exothermic reaction. • For gaseous reactions at equilibrium: Explain how an increase in pressure causes the equilibrium position to shift towards the side with the smaller number of molecules Explain how a decrease in pressure causes the equilibrium position to shift towards the side with the larger number of molecules.	
Vocabulary	Abiotic Community Abundance Adaptation Ecosystem Population	concentration temperature catalyst surface area pressure collisions	• amplitude • electromagnetic waves • frequency • longitudinal waves • mechanical wave • oscillate

	Extremophile Fertiliser Biotechnology Eutrophication Deforestation	collision theory frequency activation energy tangents Le Chateliers gas volume reversible reaction excess limiting equilibrium gas syringe	• primary seismic wave (P-wave) • rarefaction • medium • refraction • secondary seismic wave (S-wave) • seismic waves • transmission/transmitted • transverse wave • ultrasound wave • wavelength • carrier waves • charge-coupled device (CCD) • contrast medium • electromagnetic spectrum • optical fibre • radiation dose • angle of incidence • angle of reflection • concave (diverging) lens • convex (converging) lens • diffuse reflection • focal length • normal • opaque object • principal focus • real image • specular reflection • translucent object • transparent object • virtual image
Assessment	Blue Sheet Assessment for B7 and end of topic test.	Blue Sheet Assessment for C6 and end of topic test.	Blue Sheet Assessment P6 -Waves End of topic test P6 - Waves