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 7 Science**

Year 7 Curriculum Intent: The intent of the Year 7 curriculum is to build on knowledge acquired in Key Stage 2 and introduce pupils to the different areas of science at the Kingsway school:

- in Biology - Cells and Systems, Plants and the Environment, and Variation and Inheritance.
- in Chemistry - Particles and Matter, Chemical reactions, and Earth and Atmosphere.
- in Physics - Forces and Motion, Energy, and Waves.
- and across all three sciences - how to Work Scientifically.

Pupils will be taught key knowledge and skills in both theory and practical science. They will learn about the scientific method, how to keep safe and how to draw valid conclusions from data.

	Year 7, Term 1, Biology Scheme 1a: Cells and Systems	**Year 7, Term 1, Chemistry** Scheme 1b: Particles and Matter	**Year 7, Term 1, Physics** Scheme 1c: Force and Motion

Acquire	Animal and plant cells, specialised cells, hierarchy of organisation, How to prepare and specimen slide. Using a microscope.	Name the states of matter. Give examples of solids, liquids and gases. Know the concept of pure substance. Name the different changes of state. Draw particle arrangements of solids, liquids and gases	What does a force cause State the difference between mass and weight. Examples of contact forces. Example of non-contact forces. The equation for speed.
Apply	Prepare microscope slides, set up microscopes and make observations.	Recognise changes of state from particle diagrams and be able to name changes of state from diagrams Label a Bunsen burner Describe how to turn a Bunsen burner on safely Collect data from practical Plot a graph Draw before and after diagrams of particles to explain observations about changes of state, gas pressure and diffusion.	Calculate the resultant force on an object Calculate speed. Calculate weight. Draw free body diagrams. Describe the motion from free body diagrams. Interpret distance/time graphs.
Vocabulary	Cell Uni-cellular Multi-cellular Tissue Organ Diffusion Cell Membrane Nucleus Vacuole Mitochondia	Pure substance Particle model Solid Liquid Gas Diffusion Gas pressure Evaporation Condensation Melting Freezing	Resultant Force Contact / Non-contact force Interaction Resistive Equilibrium Acceleration Motion Gravitational field strength Gravitational force
Assessment	Blue Sheet Assessment for biology & working scientifically.	Blue Sheet Assessment for chemistry & working scientifically.	Blue Sheet Assessment for physics & working scientifically.
	Year 7, Term 2, Biology Scheme 2a: Cells and Systems	**Year 7, Term 2, Chemistry** Scheme 2b: Particles and Matter	**Year 7, Term 2, Physics** Scheme 2c: Energy
Acquire	Anatomy of the male and female reproductive system. Puberty, menstrual cycle, gestation and birth.	Know the concept of pure substance. Define filtration Define Evaporation Know what a mixture is	Name and describe energy stores. Name and describe energy transfers. Define conduction. Define convection.

		Define separation Identify chromatography from a diagram	Define thermal radiation. State the law of conservation of energy.
Apply	Create a calendar of events that take place during the menstrual cycle. Interpret a graph detailing the menstrual cycle. Use a diagram to show stages in development of a foetus from the production of sex cells to birth.	Carry out simple separation techniques such as chromatography Carry out filtration Carry out evaporation	Describe changes to energy stores. Describe how to increase or decrease the transfer of energy by heating.
Vocabulary	Gamete Fertilisation Ovary Testicle Oviduct Uterus Ovulation Menstruation Penis Vagina Gestation Amniotic fluid Placenta Foetus	Pure Mixture Separation Filtration Evaporation Distillation Chromatography Filter paper Evaporating dish	Conservation of energy Chemical energy store Thermal energy store Kinetic energy store Gravitational potential energy store Elastic energy store Dissipation / dissipated Efficiency Thermal conduction Thermal insulator Convection (current) (Infrared) Radiation
Assessment	Blue Sheet Assessment of biology term 1, term 2 and working scientifically.	Blue Sheet Assessment for chemistry term 1, term 2 & working scientifically.	Blue Sheet Assessment of physics term 1, term 2 and working scientifically.
	Year 7, Term 3, Biology Scheme 3: Plants and the Environment	**Year 7, Term 3, Chemistry** Scheme 3b: Chemical Reaction	**Year 7, Term 3, Physics** Scheme 3c: Waves
Acquire	Seed dispersal. Anatomy of a flower, Plant reproduction. Food chains and food webs.	Hazard symbols and their importance defining acids and alkalis in terms of neutralisation reactions Identifying household acids and alkalis the pH scale for measuring acidity/alkalinity; and indicators reactions of acids with alkalis to produce a salt	Name the types of waves. State how sound travels. State the human range of hearing. Define ultrasound. State uses of ultrasound.

		plus water displacement reactions reactions of acids with metals to produce a salt plus hydrogen the properties of metals and non-metals the order of metals and carbon in the reactivity series	
Apply	Describe the main steps that take place when a plant reproduces successfully. Using graphs, describe how a species' population changes as its predator or prey population changes. Explain effects of environmental changes and toxic materials on a species' population. Combine food chains to form a food web. Explain issues with human food supplies in terms of insect pollinators.	Identify the hazards from a range of substances Test and identify a range of household acids and alkalis Use indicators and pH meter to identify substances Make an indicator (red cabbage) Make a salt Use patterns of reactivity to make predictions for chemical reactions Predict the formulae for products of reactions between acids and metals, or acids and bases Describe in detail what happens to particles in a chemical reaction, compare and contrast physical and chemical reactions	Compare types of waves. Use the terms pitch and volume to describe sounds. Interpret oscilloscope traces.
Vocabulary	Pollen Ovules Pollination Fertilisation Seed Fruit Carpel	Hazard Symbols Acid Alkali pH Scale Universal Indicator Neutralisation Salts Indicator Chemical Reaction	Vibration Medium Vacuum Amplitude Frequency Wavelength Peak Trough Absorption Auditory range Ultrasound (kilo)Hertz Oscilloscope
Assessment	Blue Sheet Assessment of biology term 1, term 2, term 3 and working scientifically.	Blue Sheet Assessment of chemistry term 1, term 2, term 3 and working scientifically.	Blue Sheet Assessment of physics term 1, term 2, term 3 and working scientifically.

Subject: **Year 8 Science**

Year 8 Curriculum Intent: The intent of the Year 8 curriculum is to build on knowledge acquired in Year 7 and both broaden and deepen pupil knowledge in the different areas of science at the Kingsway school:

- in Biology - Cells and Systems, Plants and the Environment, and Variation and Inheritance.
- in Chemistry - Particles and Matter, Chemical reactions, and Earth and Atmosphere.
- in Physics - Forces and Motion, Energy, and Waves.
- and across all three sciences - how to Work Scientifically.

Pupils will be taught key knowledge and skills in both theory and practical science. They will learn about the scientific method, how to keep safe and how to draw valid conclusions from data.

	Year 8, Term 1, Biology Scheme 1a: Cells and Systems	**Year 8, Term 1, Chemistry** Scheme 1b: Earth and Atmosphere	**Year 8, Term 1, Physics** Scheme 1c: Energy
Acquire	Components of a balanced diet, healthy lifestyles. The anatomy of the digestive system,the role of bacteria and enzymes in the digestive system. Recall the components that make up a balanced diet. Unhealthy eating habits which include eating disorders.	the composition of the Earth the composition of the atmosphere the rock cycle and the formation of igneous, sedimentary and metamorphic rocks the carbon cycle the production of carbon dioxide by human activity and the impact on climate. properties of ceramics, polymers and composites (qualitative)..	Name / draw circuit symbols. Define current and state how to measure it. Define potential difference and state how to measure it. State the difference between series and parallel circuits.
Apply	Calculate food requirements for a healthy diet, using information provided. Describe the events that take place in order to turn a meal into simple food molecules inside a cell.	Compare the different layers of the Earth in terms of their properties Testing the properties of all three types of rock Testing the properties of ceramics, polymers and composites Investigating crystal formation of igneous rocks	Measure current and potential difference. Calculate resistance. Predict the current in a circuit. Predict the potential difference in a circuit
Vocabulary	Enzymes Dietary fibre Lipids Protein	Crust Mantle Core Sediments	Cell Potential difference Volts Voltmeter

	Stomach Carbohydrates Gut bacteria	Compaction Cementation Pressure Respiration Photosynthesis Greenhouse effect Climate change Polymer Composite materials	Current Amps Ammeter Resistance Ohms Series circuit Parallel circuit
Assessment	Blue Sheet Assessment of biology Cells & Systems topics taught in Year 7 & Year 8 and working scientifically.	Blue Sheet Assessment of chemistry Earth and Atmosphere and working scientifically.	Blue Sheet Assessment of physics Energy topics taught in Year 7 & Year 8 and working scientifically.
	Year 8, Term 2, Biology Scheme 2a: Cells and Systems	**Year 8, Term 2, Chemistry** Scheme 2b: Particles and Matter	**Year 8, Term 2, Physics** Scheme 2c: Forces & Motion
Acquire	The parts of the skeletal system. The role of joints and muscles. The gas exchanges, aerobic and anaerobic respiration, antagonistic muscles.	Differences between atoms, elements and compounds chemical symbols and formulae for elements and compounds the varying physical and chemical properties of different elements the Periodic Table: periods and groups; metals and non-metals how patterns in reactions can be predicted with reference to the Periodic Table the principles underpinning the Mendeleev Periodic Table	Draw magnetic fields. Identify magnetic materials. State useful features of an electromagnet. Define pressure. Describe the motion of particles in solids, liquids, and gases. State the equation for density.
Apply	Use word equations to describe aerobic and anaerobic respiration. Explain how specific activities involve aerobic or anaerobic respiration.	Demo of alkali metal reactions Investigating properties of elements, mixtures and compounds	Describe how to change the strength of an electromagnet. Describe how magnets and magnetic materials interact. Calculate pressure. Describe how the motion and energy of particles changes during changes of state. Compare the density of different materials.

Vocabulary	Aerobic Respiration Anaerobic Respiration Fermentation Lactic Acid		Atom Element Compound Symbols Formula Chemical properties Physical properties Periodic Table Mendeleev's periodic table Alkali metals	Magnetic field Permanent magnet Magnetic material Temporary magnet Solenoid Electromagnet Pressure Fluid Incompressible Upthrust Density
Assessment	Blue Sheet Assessment of biology Cells & Systems topics taught in Year 7 & Year 8 and working scientifically.		Blue Sheet Assessment of chemistry Particles and matter topics taught in Year 7 & Year 8 and working scientifically.	Blue Sheet Assessment of physics Forces & Motion topics taught in Year 7 & Year 8 and working scientifically.
	Year 8, Term 3, Biology Scheme 3ai: Plants and the Environment	**Year 8, Term 3, Biology** Scheme 3aii: Cells and Systems	**Year 8, Term 3, Chemistry** Scheme 3b: Earth and Atmosphere	**Year 8, Term 3, Physics** Scheme 3c: Waves
Acquire	Photosynthesis, the anatomy of a leaf, minerals and their importance in the healthy growth of a plant.	Pathogens; what they are and how they can enter the body. Antibiotics, immunisations and antibiotic resistance. Sexually transmitted diseases. Drug classification, Effects of drugs, alcohol, tobacco and vaping on the body.	properties of ceramics, properties of polymers Properties of composites (qualitative). Recall the 8 planets in the solar system Recall objects and entities found in the solar system Recall the seasons on earth Name the phases of the moon	Label a ray diagram. Measure angles with a protractor. State the law of reflection. Define the terms: 'transparent', 'translucent' & 'opaque'. State the seven colours of the visible spectrum. State the three primary colours of light. State the three secondary colours of light.

Apply	Sketching a line graph to show how the rate of photosynthesis is affected by changing conditions, including limiting factors. Use a word equation to describe photosynthesis in plants and algae. Investigate plant mass and gas exchange in a plant. Investigating photosynthesis: Comparing different sizes of leaves and the production of oxygen.	Fermentation of yeast investigating the production of alcohol. Describe the effect of alcohol, vaping and smoking on behaviour, health and the effect on conception and pregnancy. Describe how communicable diseases can be spread.Explain how microbes cause illness. Describe how the immune system and medical treatments prevent disease.	Testing the properties of ceramics, polymers and composites Explaining how we get summer and winter on earth Ordering the size of objects in the universe Describing night and day	Draw ray diagrams to show reflection and refraction. Use ray diagrams to show how images are formed. Explain why objects appear a particular colour in white light, in coloured light or when using a filter.
Vocabulary	Fertilisers Photosynthesis Chlorophyll Stomata	Pathogen Transmission Immunisation Antibiotics Communicable	ceramics clay brittle insulator melting point natural resources mineral ore displacement extraction recycling electrolysis galaxy orbit light year exo planet stars	Reflect Absorb Transmit Transparent Translucent Opaque Image Spectrum Angle of incidence Incident ray Angle of reflection Reflected ray Normal Scattered Specular Reflection Diffuse scattering Refraction

			season moon phase satellite solar system	Angle of refraction Refracted ray Converging / Convex Diverging / Concave
Assessment	Blue Sheet Assessment of biology Plants and the Environment topics taught in Year 7 & Year 8 and working scientifically.	Blue Sheet Assessment of biology Cells & Systems topics taught in Year 7 & Year 8 and working scientifically.	Blue Sheet Assessment of chemistry Earth and Atmosphere topics taught in Year 7 & Year 8 and working scientifically.	Blue Sheet Assessment of physics Waves topics taught in Year 7 & Year 8 and working scientifically.

Subject: **Year 9 Science**

Year 9 Curriculum Intent: The intent of the Year 9 curriculum is to build on knowledge acquired in both Year 7 and Year 8 and prepare pupils for the final steps before undertaking GCSE science. They will increase the depth and breadth of their knowledge and build strong links in learning to consolidate prior learning and secure the foundations for GCSE science. Pupils will continue to study the different areas of science:

- in Biology - Variation and Inheritance.
- in Chemistry - Chemical reactions.
- in Physics - Forces and Motion and Energy.
- and across all three sciences - how to Work Scientifically.

Pupils will be taught key knowledge and skills in both theory and practical science. They will learn about the scientific method, how to keep safe and how to draw valid conclusions from data.

	Year 9, Term 1, Biology Scheme 1a: Variations and Inheritance	**Year 9, Term 1, Chemistry** Scheme 1b: Chemical Reactions	**Year 9, Term 1, Physics** Scheme 1ci: Energy	**Year 9, Term 1, Physics** Scheme 1cii: Force & Motion
Acquire	Variation, natural selection and the effect on biodiversity. Genetic material.	Define exothermic reactions Define endothermic reactions Define rate of reaction Name the factors which affect rate	Can name the eleven different energy resources used to generate electricity. Can simply describe how the energy	State the equation that links: force, distance and work done, Define the term centre of mass.

			resources can be used to provide electricity. Can state pros and cons of each energy resource.	Find the centre of mass of a regularly shaped 2D object. Define the term moment. State how a force affects the extension of a spring.
Apply	Plotting bar charts or line graphs to show discontinuous or continuous variation data. Use evidence to explain why a species has become extinct or changed over time. Explain how a lack of biodiversity effects an ecosystem.	Draw and label reaction profiles graphs for exothermic and endothermic reactions including overall energy change and activation energy Know that bond breaking is endothermic Know that bond forming is exothermic Write sentences to explain how different factors affect rate of reaction Complete and analyse required practical on energy changes	How to write an evaluation of energy resources.	Calculate the extension of a spring after a force is applied. Describe how to find the centre of mass of an irregularly shaped 2D object. Estimate and explain the location of mass in a 3D object. Use primary data to find the link between force applied and extension.
Vocabulary	Extinct Competition Evolution Biodiversity Continuous Discontinuous	energy exothermic endothermic activation energy thermal decomposition combustion energy level diagram cell battery fuel cell rechargable catalyst	Renewable Non-renewable Fossil fuel Biomass Hydroelectric Geothermal Generator	Extension Elastic Inelastic Centre of mass Moment Pivot

Assessment	Blue Sheet Assessment of biology Variation & inheritance topics taught in KS3 and working scientifically.	Blue Sheet Assessment of chemistry Chemical reactions topics taught in KS3 and working scientifically.	Blue Sheet Assessment of physics Energy topics taught in KS3 and working scientifically.	Blue Sheet Assessment of physics Force & motion topics taught in KS3 and working scientifically.
	Term 2, Biology Scheme 2a: Cells and Systems	**Year 9, Term 2, Chemistry** Scheme 2b: C1 Atomic Structure and Periodic Table	**Year 9, Term 2 & 3, Physics** Scheme 2c: P1 Energy	
Acquire	Eukaryotic and prokaryotic cells, specialised cells, mitosis. Diffusion, Osmosis and Active Transport, Effect of surface area on the cell transport process.	The names and properties of subatomic particle and working out numbers of subatomic particles Electron structure and how shells are filled up Separation methods and techniques Know what a group is. Know what a period is. Know the separation between metals and nonmetals on the periodic table	Name the 5 energy stores Name the 4 energy pathways / transfers Recall the kinetic energy equation Recall the units for energy, mass, velocity, spring constant, extension, height, specific heat capacity, temperature, power, & time. Recall the equation for gravitational potential Define specific heat capacity Recall the equation P=E/t Define power State that work done = energy transferred Recall the law of conservation of energy Define closed system State how energy can be dissipated State how unwanted energy transfers can be reduced Define thermal conductivity Recall the equations for efficiency Name the main energy resources available to use on Earth Define renewable resource State the uses of energy resources Recognise the main energy source available in a given situation Name renewable and non-renewable energy resources State the environmental impacts of energy resources	
Apply	Explain how surface area to volume ratio varies	Draw diagrams with correctly labelled parts of	Use an equation to find an unknown variable	

	depending on the size of an organism. Rearrange the IAM equation to find magnification or actual size of a cell. Make a specimen slide safely, view a slide, draw accurate observations and calculate the magnification used. Calculate and compare surface area: volume ratios. Explain how the small intestine and lungs in mammals, and roots and leaves in plants, are adapted for exchange of substances. Describe and explain how an exchange surface is made more effective. Apply knowledge of osmosis to unfamiliar situations and make predictions.	atom Draw diagrams with correctly filled shells for atoms and ions Write clear descriptions of how mixtures are separated Describe the properties of groups of elements, group 1, 7 and 0 Demo of alkali metals in water and descriptions of reactions	Apply the principle of conservation of energy to qualitative descriptions of energy transfers Write methods for experiments. Accurately plot axes & graphs Draw lines of best fit and use them to find tangents and gradients. Describe how to experimentally find the specific heat capacity of a substance (RP1)	
Vocabulary	Prokaryotic Eukaryotic Mitochondria Ribosome Differentiation Magnification Resolution Diffusion Osmosis Active Transport Concentration gradient Passive Partially permeable	sub atomic atomic theory plum pudding model electron shells energy levels group period relative mass charge filtration distillation chromatography	System Elastic potential store Chemical store Gravitational potential store Thermal store Kinetic store Specific heat capacity Delocalised Thermal conductivity Efficiency	
Assessment	Blue Sheet Assessment B1 - Cells & Systems End of topic test - B1 Cells & Systems	Blue Sheet Assessment C1 - Atomic Structure & Periodic Table End of topic test - C1 - Atomic Structure & Periodic Table	Blue Sheet Assessment P1 - Energy End of topic test - P1 Energy	
	Term 3, Biology Scheme 3a: B4 Bioenergetics.	**Term 3, Chemistry** Scheme 3b: C5 Energy Changes		
Acquire	Photosynthesis; equation, factors affecting photosynthesis.Uses of glucose (CROPS). Aerobic and anaerobic respiration. Metabolism.	Define exothermic and endothermic in terms of energy released or absorbed. Identify activation energy and overall energy change on an energy profile diagram.		

Apply	Explain the gases released from a plant at different times of the day. Explain graphs describing limiting factors and how these factors affect photosynthesis. Calculate cardiac output.	Construct energy profiles for exo and endothermic reactions, identify and explain the meaning of activation energy. Use bond energies to calculate overall energy changes in terms of bonds being broken and formed during a reaction.		
Vocabulary	Photosynthesis Stomata Chloroplast Endothermic Exothermic Aerobic respiration Anaerobic respiration Mitochondria	energy exothermic endothermic activation energy thermal decomposition combustion energy level diagram cell battery fuel cell rechargable catalyst		
Assessment	Blue Sheet Assessment B4 - Bioenergetics End of topic test - B4 Bioenergetics	Blue Sheet Assessment C5 - Energy Changes End of topic test - C5 - Energy Changes		

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. Describe the functions of the heart and circulatory system.	• 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 ions produced by Groups 6 and 7.	• 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 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 organs that make up the plant transport system.	• 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. • Know that fullerenes are molecules of carbon atoms with hollow shapes.	• 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 role of xylem; phloem and root hair cells. Define the terms 'transpiration' and 'translocation'. Define the term 'active transport'.		
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. Describe the effects of diet, smoking, alcohol and exercise on health.	● 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 ● Work out the empirical formula of an ionic compound from a given model or diagram that shows the ions in the structure.	● 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 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.		
Vocabulary	Benign tumour Bile Blood Cancer Enzymes Health Malignant tumour Meristem tissue Non-communicable disease Organ systems Risk factor	Ionic covalent metallic electrons diamond graphite melting point boiling point bonds structure properties delocalised particle model conduction tetrahedral layers intermolecular	• 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

	Translocation Transpiration		
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). • Understand that the number of atoms, molecules or ions in a mole of a given substance is the Avogadro constant. The	• 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 • Name the equipment used to detect radioactive decay • Give uses of nuclear radiation

		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.	• 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. • Calculate the percentage yield of a product from the actual yield of a reaction.	• 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)

		• 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.

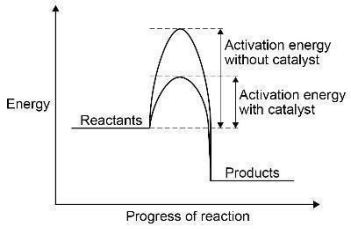
	Explain why antibodies are specific for one pathogen/ antigen. Explain how vaccines prevent disease. Describe the problems associated with antibiotic resistance. Describe Fleming's discovery and explain its importance. Explain how antibiotics treat only bacterial diseases and how this has saved lives. 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

Subject: **Year 11 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 genetics and human biology, organic chemistry and chemical reactions, waves and forces, 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 11, Term1 B5 Homeostasis and Response	**Year 11, Term 1, Chemistry** C7 Organic Chemistry	**Year 11, Term 1, Physics** P5: Forces
Acquire	Recall what homeostasis is and why it is important. Recall examples of conditions that need to be controlled. Recall the roles of the nervous system and the endocrine system in homeostasis. Recall the main components of a control system and their functions. Recall the functions of the main structures in the nervous system.	● Be able to recognise substances as alkanes given their formulae in these forms. ● Describe the formation of crude oil. ● Describe the composition of crude oil. ● Define a hydrocarbon. ● Explain what is meant by the formula ● C_nH_{2n+2} ● Make molecular models and work out general formula for the alkanes. ● Draw the covalent bonding in: ● methane ● ethane ● propane ● butane. ● Define the term saturated	● State the units of: weight, mass, gravitational field strength, work done, distance, spring constant, extension, moment, pressure, area, speed, acceleration, velocity, momentum, ● Define scalar and vector ● Give examples of scalar and vector quantities ● Draw arrows to scale to represent a vector quantity ● Define a contact and non-contact force ● Give examples of contact and non-contact forces ● State the difference between weight and mass

	Recall the differences between voluntary and reflex actions. Recall the stages of a reflex action Describe the endocrine system Recall the term hormone. Recall the locations of organs in the endocrine system. Recall why the pituitary gland is often called the master gland. Recall how blood glucose concentration is monitored and controlled. Recall when insulin is produced and how it helps to control blood glucose levels. Recall glycogen as a stored carbohydrate. Recall the cause, treatment and problems associated with Type 2 diabetes. Recall the terms hormonal and non-hormonal methods of contraception. Recall the use of fertility drugs in women with low FSH levels. Recall where and when adrenaline is released and its target organs. Recall the effects of adrenaline on the body. Recall where thyroxine is produced and its effects on the body.	• Describe how fractional distillation works in terms of evaporation and condensation. • Describe in general terms the conditions used for catalytic cracking and steam cracking. • Recall the colour change when bromine water reacts with an alkene. • Recall how boiling point, viscosity and flammability change with increasing molecular size. • Write balanced equations for the complete combustion of hydrocarbons with a given formula. • Knowledge of trends in properties of hydrocarbons is limited to: ● boiling points ● viscosity ● flammability. • Describe the balanced symbol equation including moles present, reactants and products. • Describe the reaction including moles present, reactants and products. • Describe what happens when any of the first four alcohols react with sodium, burn in air, are added to water, react with an oxidising agent. • Recall the main uses of these alcohols. • Know the conditions used for fermentation of sugar using yeast. • Be able to recognise alcohols from their names or from given formulae. • Describe what happens when any of the first four carboxylic acids react with carbonates, dissolve in water, react with alcohols. • (HT only) • Recognise carboxylic acids from their names or from given formulae. • Students do not need to know the names of individual carboxylic acids other than methanoic acid. • Recognise addition polymers and monomers from diagrams in the forms	• Recall the equation that links: weight, mass and gravity • Define centre of mass • Define resultant force • Recall the equation that links: work done, force, and distance • Know that work done is equivalent to the energy transferred • Describe the difference between elastic and inelastic deformation • Describe how to stretch, compress or bend an object • Recall the equation that links: force, spring constant, and extension. • Describe the difference between linear and non-linear relationships • Know what is meant by the term moment (triple only) • Give examples of simple levers (triple only) • Know what is meant by a fluid (triple only) • Define pressure (triple only) • Describe how the density of a fluid changes with height (triple only) • Describe how pressure of the atmosphere changes with altitude (triple only) • Describe what is meant by upthrust (triple only) • Describe why some objects float and others sink (triple only) • Define displacement • Define velocity • Know the typical speed for: walking, running, cycling, sound in air • Recall the equation that links: distance travelled, speed, and time.

	Triple Science Biology Only Identify the cerebral cortex, cerebellum and medulla on a diagram and recall the function of each. Label a diagram of the eye and describe the function of each structure. Define the term 'accommodation'. Recall different methods to measure body temperature. Recall how body temperature is monitored and controlled. Describe where water, ions and urea are lost from the body. Label a diagram of the excretory system. Recall the advantages and disadvantages of a kidney transplant. Recall how a kidney machine works. Recall how plant shoots and roots respond to light and gravity. Recall the role of auxin in plant responses in terms of unequal distribution in shoots and roots. Recall how auxins are used as weed killers and rooting powders, and to promote growth in tissue culture.	shown and from the presence of the functional group -C=C- in the monomers. ● Draw diagrams to represent the formation of a polymer from a given alkene monomer. ● Relate the repeating unit to the monomer. ● Explain the basic principles of condensation polymerisation by reference to the functional groups in the monomers and the repeating units in the polymers. ● Be able to name the types of monomers from which these naturally occurring polymers are made. ● Describe the structure of DNA in terms of two polymer chains and nucleotides.	● Recognise how the gradient of a of a d-t graph describes motion ● Recall the equation that links: acceleration, change in velocity, and time. ● Recognise how the gradient of a of a v-t graph describes motion ● State what happens to an object if the resultant force is zero ● State what is meant by inertia (higher tier) ● Recall the equation that links: force, mass, and acceleration. ● State Newton's 2nd law ● State Newton's 3rd law ● Recall the equation for stopping distance ● Recall and describe factors that affect thinking distance ● Recall and describe factors that affect braking distance ● Recall typical reaction times ● Recall the equation that links: momentum, mass, and velocity (higher tier). ● State the law of conservation of momentum (high tier) ● Recall the equation that links: force, change in momentum, and time (higher tier & triple-only)

Apply	Explain the importance of being able to respond to environmental changes and coordinate behaviour. Explain how the nervous system is adapted for its functions. Explain the role of chemicals at synapses. Describe and use different methods to measure reaction time. Explain the importance of reflex actions and give examples. Compare the actions of the nervous and endocrine systems. Compare the causes, and treatments of Type 1 and Type 2 diabetes. Recall secondary sexual characteristics of boys and girls. Recall the cause of these changes in boys and girls and their relevance in reproduction. Describe the menstrual cycle and fertility including the role of hormones. Explain how hormonal and non-hormonal contraceptives work. Explain the process of In Vitro Fertilisation (IVF).	● Plot boiling points of alkanes against number of carbons. ● Explain how fractional distillation works in terms of evaporation and condensation. ● Balance chemical equations as examples of cracking given the formulae of the reactants and products. ● Research uses of common alkenes. ● Give examples to illustrate the usefulness of cracking. ● Be able to explain how modern life depends on the uses of hydrocarbons. ● Explain what is meant by the formula C_nH_{2n} ● Write balanced symbol equations for the combustion of alkenes in oxygen. ● Write the reaction between an alkene and hydrogen, giving suitable examples. ● Write the reaction between an alkene and water, giving suitable examples. ● Make predictions of the boiling points of other alkanes. ● Suggest the impact on fuels, feedstocks and petrochemicals of the depleting stocks of crude oil. ● Explain the properties of hydrocarbons in relation to intermolecular forces. ● Write balanced symbol equations for the combustion of hydrocarbon fuels. ● Describe the balanced symbol equation including moles present, long alkane reactant, specific reaction conditions, and alkene and short alkane products. ● Draw the covalent bonding in: ● ethene ● propene ● butene ● pentene.	● Use an equation to find an unknown variable ● Draw scale diagrams ● Calculate the resultant of parallel forces ● Calculate the extension of a linear object ● Use primary data and a graph to calculate the spring constant ● Calculate the resultant of non-parallel forces (higher tier only) ● Write methods for experiments ● Resolve a force into two perpendicular components (higher tier only) ● Draw free body diagrams

	Explain how levels of adrenaline are controlled by a negative feedback system. Explain how its release is stimulated by thyroid stimulating hormone and the levels of these two hormones are controlled by a negative feedback system. **Triple Science Biology Only** Describe how the eye changes to focus on near and distant objects. Complete simple ray diagrams to show normal vision, long-sightedness and short-sightedness Describe and explain the changes that happen when body temperature is too high or too low. Explain why we drink more fluid during hot weather. Explain why there is no control over water, ion and urea loss by the lungs and skin. Explain when cells might gain or lose too much water, in terms of osmosis (links to B1)). Describe the effect of too much or too little water on cells. Explain how the body responds to different temperature and osmotic challenges in terms of sweat and urine release. Describe how urine is produced.	● Explain why carboxylic acids are weak acids in terms of ionisation and pH. Draw the covalent bonding in: ● methanoic acid ● ethanoic acids ● propanoic acid ● butanoic acid. Describe what happens to one of the first four acids during the reactions: ● dissolving in water to produce acidic solutions ● reacting with carbonates to produce carbon dioxide ● not ionising completely when dissolved in water (they are weak acids) ● reacting with alcohols in the presence of an acid catalyst to produce esters, for example ethanoic acid reacts with ethanol to produce ethyl ethanoate and water. ● Describe what takes place during condensation polymerisation. ● Identify monomers, polymers and repeating units. ● ● Describe the polymerisation of ethane-1,2-diol and hexanedioic acid.	

	Describe the absorption of glucose and ions by diffusion and active transport (link to B1). Explain why dialysis fluid contains sugar and ions at the same concentration as normal blood, but no urea. Evaluate the use of kidney transplants and dialysis to treat kidney failure. Explain the role of auxin in plant responses in terms of unequal distribution in shoots and roots. Describe the use of ethene to control the ripening of fruit during storage and transport. Describe the use of gibberellins to end seed dormancy, promote flowering and to increase fruit size.		
Vocabulary	Homeostasis Receptor Nervous system Reflex Biodiversiry Menstrual Cycle Endocrine **Triple Science Only** Cortex Cerebellum Medulla Retina Sclera Cornea Iris Ciliary muscles Suspensory ligaments	Hydrocarbons Alkanes Cracking Saturated Unsaturated Fractional Distillation Condensing boiling point Alkenes Displayed structure properties Alcohols Carboxylic Acids Addition Reactions Polymerisation proteins intermolecular	• displacement • effort • force multiplier • forces • free-body force diagram • friction • load • magnitude • moment • Newton’s first law of motion • Newton’s third law of motion • parallelogram of forces • principle of moments • resultant force • scalar • vector • acceleration • displacement

	Accommodation Myopia Hyperopia Auxin Gibberellins Ethene		• velocity • braking distance • conservation of momentum • elastic • extension • gravitational field strength, g • inertia • limit of proportionality • momentum • Newton's second law of motion • stopping distance • terminal velocity • thinking distance • weight • upthrust
Assessment	Blue Sheet Assessment for B5 and end of topic test.	Blue Sheet Assessment for C7 and end of topic test.	Blue Sheet Assessment P5: Forces End of topic test P5: Forces
	Year 11, Term 2 B6 Inheritance, Variation and Evolution	**Year 11, Term 1/2, Chemistry** C8 Chemical Analysis	**Year 11, Unit 2 (Term 2)** P7: Electromagnetism
Acquire	Recall sexual reproduction produces variation in the offspring, but asexual reproduction does not. Recall sexual reproduction in animals and plants. Recall the term clone. Recall cuttings as clones of plants. Define meiosis. Describe the process of meiosis to include the number of chromosomes at each stage. Define fertilisation. Describe using a Punnett square and genetic diagram how sex is determined in humans. Define the term gametes and describe their genetic material. Draw diagrams to explain how gametes are formed in meiosis.	• Define the terms: • pure substance • compound. • Use data to identify pure and impure substances. • Identify the contents of mineral waters sold as 'pure'. Discuss the meaning of 'pure'. • Define the terms: • mixture • formulation. • Describe a method for paper chromatography. • Describe what the R_f value is and instructions on how to calculate the R_f value. • Devise a method for distinguishing between pure and impure substances using chromatography. • Describe the tests for hydrogen, oxygen, chlorine and carbon dioxide.	• State where the magnetic forces are strongest relative to a magnet • Know how magnets behave • Know the difference between permanent magnets, magnetic materials and electromagnets • Know what is meant by the term 'magnetic field' • State which materials are magnetic • Sketch the diagram of the magnetic field around: a bar magnet, the Earth, a straight wire and a solenoid. • Describe how to plot the magnetic field using a magnet and compass • State that a current carrying wire produces a magnetic field around it. • Describe how to increase the strength of an electromagnet • Recall the corkscrew rule

	Recall the number of chromosomes in the gametes during meiosis and fertilisation. Recall that plants can reproduce sexually to produce seeds and asexually by runners. Recall the structure of chromosomes, DNA and genes. Recall that a gene is a small section of DNA that codes for a particular sequence of amino acids to make a specific protein. Define the term genome. Recall what a mutation is. Give examples of characteristics controlled by a single gene and describe their alleles. Give examples of characteristics controlled by multiple genes. Define and use the terms: gametes, genotype, phenotype, dominant recessive, homozygous and heterozygous. Describe the inherited disorders polydactyly and cystic fibrosis. Define the term genetic engineering. Recall the process of genetic engineering and its advantages. Recall plant cloning techniques to include: · taking plant cuttings · tissue culture. Explain why identical twins are clones. Describe animal cloning techniques to include: · embryo transplants	● Describe the flame tests for identifying cations to another student. ● Describe how sodium hydroxide can be used to identify some cations to another student. ● Describe how dilute acids can be used to identify carbonates. ● Describe how silver nitrate can be used to identify halides. ● Describe how barium chloride in the presence of dilute hydrochloric acid can be used to identify sulfate ions. ● Describe the process of flame emission spectroscopy. ● ● Discuss the advantages and disadvantages of instrumental analysis versus test tube analysis. ● State advantages of instrumental methods compared with the chemical tests in this specification. ● on the Earth, atmosphere and everyday life. ● Describe how carbon monoxide, soot (carbon particles), sulfur dioxide and oxides of nitrogen are produced by burning fuels ● Predict the products of combustion of a fuel given appropriate information about the composition of the fuel and the conditions in which it is used. ● Write word equations for complete and incomplete combustion.	

	· adult cell cloning. Recall classification of characteristics as being due to genetic, environmental or a combination of these causes. Recall examples of continuous and discontinuous variation. Recall why humans selectively breed plants and animals. Recall selective breeding as a type of sexual reproduction. Describe the process of selective breeding and give examples. Describe evolution by Darwin's theory of natural selection, recalling the main stages of natural selection. Recall why mutation may lead to more rapid change in a species. Define the term species. Identify organisms that are of different species. Recall the work of Alfred Russel Wallace on natural selection. Recall the work of Jean-Baptiste Lamarck. Define the terms inherited and acquired characteristics. Recall types of evidence for the theory of evolution by natural selection. Define the term 'fossil'. Recall how fossils may be formed. Define the term extinction. Explain how extinction may be caused.		

	Triple Science Biology Only Recall advantages and disadvantages of asexual and sexual reproduction. Explain the structure of DNA using diagrams and models. Recall how the bases on the two strands link together. Describe some of the experiments carried out by Mendel using pea plants. Recall a timeline showing the main developments in the understanding of inheritance Recall the work of Wallace.		
Apply	Explain why sexual reproduction produces variation in the offspring, but asexual reproduction does not. Explain why sexual reproduction results in variety. Compare mitosis and meiosis Describe advantages and disadvantages of sexual and asexual reproduction. Describe some organisms that can reproduce by both methods (Malarial parasite and types of fungi). Explain using a Punnett square and genetic diagram how sex is determined in humans. Explain the probability of having a child that is a boy or a girl. Explain how knowledge of the human genome will help medicine in the future.	● Be able to use melting point data to distinguish pure from impure substances. ● Interpret chromatograms and determine R_f values from chromatograms. ● Provide answers to an appropriate number of significant figures. ● Research how chemical analysis has been used to detect and solve crimes especially in forgery and murder by poisoning. ● Research how robotic spacecraft sent to investigate other planets analyse their atmospheres and surface materials using instrumentation. ● Research instrumental methods for detecting elements and compounds. ● Suggest advantages of the instrumental methods compared with the chemical tests. Explain, in terms of intermolecular forces, the terms: ● melting point ● boiling point.	● Describe how to plot the magnetic field using a magnet and compass ● 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 the ethical issues related to DNA sequencing. Use genetic cross diagrams to explain inheritance and carriers. Make informed judgements about the economic, social and ethical issues concerning embryo screening. Describe the use of genetic modification to treat genetic disorders. Explain why Mendel proposed the idea of separately inherited factors and why the importance of this discovery was not recognised until after his death. Predict and explain the outcome of crosses using genetic diagrams based on Mendel's experiments and using unfamiliar information. Evaluate the use of genetic engineering in medicine, eg in gene therapy and production of hormones and some vaccines. Interpret information about genetic engineering techniques. Make informed judgements about the economic, social and ethical issues concerning genetic engineering and GM crops. Explain the importance of cloning to plant growers. Interpret information about plant cloning techniques. Explain advantages and disadvantages of plant cloning techniques. Evaluate arguments for and against human cloning.	● Explain what happens to substances during the process of chromatograph. ● Suggest how chromatographic methods can be used for distinguishing pure substances from impure substances. ● Be able to write balanced equations for the reactions to produce the insoluble hydroxides. ● Explain what happens to a sample throughout the process of flame emission spectroscopy. ● Interpret instrumental results for flame emission spectroscopy. Compare these to chemical tests carried out in this specification	

	Make informed judgements about the economic, social and ethical issues concerning cloning. Explain the benefits and risks of selective breeding in plants and animals. Interpret evolutionary trees Identify differences between Darwin's theory of evolution and conflicting theories. Suggest reasons for the different theories. Explain why scientists cannot be certain how life began on Earth. Explain how fossils provide evidence for evolution. Explain what we should do to slow down the rate of development of resistant strains of bacteria (Link to B3). Explain that organisms become extinct because something changes and the species cannot adapt quickly enough to the new circumstances. Triple Science Biology Only Describe in simple terms how a protein is synthesised. Describe how a mutation could affect the formation of a protein, including enzymes and how the shape of the protein links to enzyme action (link to B2). Explain how new species arise using the terms: isolation genetic variation natural selection speciation.		

Vocabulary	Asexual Sexual Meiosis DNA Genome Double Helix Bases Chromosomes Variation Evolution Selective breeding Cloning Extinct Resistance bacteria Linnean	Pure Formulation Compounds Mixtures Chromatography Retention Factor (Rf) Stationary phase Mobile phase Solubility Insoluble Positive ions Negative ions Cations Anions Flame emission Spectroscopy	• alternator • dynamo • electromagnet • electromagnetic induction • Fleming's left-hand rule • generator effect • induced magnetism • magnetic field • magnetic field line • magnetic flux density • motor effect • solenoid • split-ring commutator • step-down transformer • step-up transformer • transformer
Assessment	Blue Sheet Assessment for B6 and end of topic test.	Blue Sheet Assessment for C8 and end of topic test.	Blue Sheet Assessment P7: Electromagnetic, End of topic test P7: Electromagnetic
		Year 11, Term 2, Chemistry C9 Atmospheric Chemistry	**Year 11, Unit 3 (Term 2)** P8: Space (GCSE Physics only)
Acquire		. • Describe the composition of the atmosphere. • Describe the approximate levels of gases in Earth's early atmosphere. • Draw accurate pie charts for the composition of the atmosphere. • Describe how sedimentary rocks formed and locked up carbon dioxide. • Describe the main changes in the atmosphere over time and some of the likely causes of these changes. • Describe and explain the formation of deposits of limestone, coal, crude oil and natural gas. • Describe how sedimentary rocks formed and locked up carbon dioxide.	• Name the celestial objects found in the Solar System • Describe how the Sun and planets in our Solar System formed • Describe and explain the life cycle of stars • Know that gravity is the force that maintains the motion of celestial objects • Describe red-shift and understand how this provides evidence of the Big Bang • Explain the evidence for the Big Bang • State what is meant by 'dark energy' and 'dark matter'

		• Describe the greenhouse effect in terms of the interaction of short and long wavelength radiation with matter. • Recall two human activities that increase the amounts of each of the greenhouse gases carbon dioxide and methane. • Evaluate the quality of evidence in a report about global climate change given appropriate information. • Describe uncertainties in the evidence base. • Describe how greenhouse gases are produced • Describe briefly four potential effects of global climate change • Identify the effects of global warming. • Explain the effects of climate change. • Describe what a carbon footprint is. Describe how emissions can be reduced. Suggest the consequences of the reductions	
Apply		• Given appropriate information, interpret evidence and evaluate different theories about the Earth's early atmosphere • Describe the effect of greenhouse gases on wavelength. • Compare the Earth's atmosphere to that of Mars and Venus. • Discuss the scale, risk and environmental implications of global climate change. • Use the internet to obtain numerical predictions for the effects of climate change. Using these predictions, suggest the possible effects on the Earth and atmosphere should the predictions become reality. • Suggest the consequences of the reductions on the Earth, atmosphere and everyday life. Predict the products of combustion of a fuel given appropriate information about the	•

		● composition of the fuel and the conditions in which it is used. ● Describe the effect of the following products: ● Carbon monoxide on the human body. ● Sulfur dioxide and oxides of nitrogen on acidity of rain water. ● Sulfur dioxide and oxides of nitrogen on respiratory system. ● Particulates on global dimming. Particulates on human health problems ● Extended writing: describe the theory of the evolution of the Earth's early atmosphere. ● Extended writing: explain why the composition of the atmosphere has changed over billions of years. ● Compare the Earth's atmosphere to that of Mars and Venus. ● Extended writing: explain how algae and plants have caused the concentrations of oxygen in the atmosphere to increase. ● Extended writing: explain how algae and plants have caused the concentrations of carbon dioxide in the atmosphere to decrease. ● Grade 9: explain why the wavelength changes due to greenhouse gases. ● Evaluate the quality of evidence in a report about global climate change given appropriate information. ● Describe how greenhouse gases are produced. ● Evaluate the use of models for predicting climate change. ● Use these equations to describe the reactions in terms of reactants, products made and number of each present. ● Explain why the following can be produced in combustion: ● carbon dioxide ● carbon monoxide ● soot ● water vapour ● sulfur dioxide	

		● oxides of nitrogen.	
Vocabulary		Crust Mantle Core Atmosphere Greenhouse effect Long wave radiation Short wave radiation Pollutants Methane Carbon dioxide Greenhouse gases particulates Climate change Weather Climate Carbon footprint	● Big Bang theory ● black dwarf ● black hole ● centripetal force ● cosmic microwave background radiation (CMBR) ● dark matter ● main sequence ● neutron star ● protostar ● red giant ● red supergiant ● red-shift ● supernova ● white dwarf
Assessment		Blue Sheet Assessment for C9 and end of topic test.	Blue Sheet Assessment P8: Space End of topic test P8: Space **GCSE PHYSICS ONLY**
		Year 11, Term 2 Chemistry C10 Using resources	
Acquire		. ● State examples of natural products that are supplemented or replaced by agricultural and synthetic products. ● Distinguish between finite and renewable resources given appropriate information. ● Define the terms: ● finite ● renewable. ● Distinguish between potable water and pure water. ● Describe the differences in treatment of ground water and salty water.	●

		● Give reasons for the steps used to produce potable water. ● Define the terms: ● potable water ● pure water. ● Describe what a LCA is using a suitable example. ● Discuss the negative issues relating to LCAs and why caution should be used when using them ● Define the following terms using suitable examples: ● corrosion ● rusting ● sacrificial protection. ● Describe how to prevent corrosion using the examples: ● oxide coating on aluminium ● zinc on iron ● magnesium on steel. ● Use suitable examples to explain why corrosion can be prevented using barriers and the role of sacrificial barriers if appropriate to the example used. ● Describe experiments and interpret results to show that both air and water are necessary for rusting. ● Recall a use of each of the alloys specified ● Interpret and evaluate the composition and uses of alloys other than those specified, given appropriate information. ● Define the terms: ● alloy ● high carbon steel ● low carbon steel. ● Explain how low density and high density poly(ethene) are both produced from ethene. ● Explain the difference between thermosoftening and thermosetting polymers in terms of their structures. ● Compare quantitatively the physical properties of glass and clay ceramics, polymers, composites and metals.	

		• Recall a source for the nitrogen and a source for the hydrogen used in the Haber process. • State where the raw materials in the Haber process come from. • Describe the process for manufacturing ammonia. • Recall the names of the salts produced when phosphate rock is treated with nitric acid, sulfuric acid and phosphoric acid • • Compare the industrial production of fertilisers with laboratory preparations of the same compounds, given appropriate information.	
Apply		• . Extract and interpret information about resources from charts, graphs and tables. • Use orders of magnitude to evaluate the significance of data. • Evaluate the impacts and benefits of biological methods of extracting meta • Research information for the processes of: • phytomining • bioleaching. • Include percentage of metal extracted, concentration of global warming gases released, amount of electricity used etc. Use this data in an evaluation. • Use information to interpret the LCA of a given material or product. • Explain sacrificial protection in terms of relative reactivity. • Using diagrams, describe the difference between metals and their alloys • Research the first alloy to include the history of it and its uses. • Model an alloy using different size marbles. Use this model to discuss the properties of alloys. • Describe how the following are produced and give uses for each: • soda-lime glass • borosilicate glass	•

		● clay ceramics ● low-density poly(ethene) ● high density poly(ethene) ● composites. ● Using diagrams, describe the structure of the following polymers: ● thermosoftening ● thermosetting. ● Use these diagrams and descriptions to explain why the following happens when heated: ● thermosoftening polymers melt ● thermosetting polymers do not melt. ● Extended writing: compare how fertilisers are produced in industry and in the laboratory. ● Investigate what was used as fertilizer before the industrial preparation of fertilisers was invented. ● Explain the differences between the two terms using suitable examples. ● Explain the differences between the two terms. ● Extended writing: describe the process of desalination. ● Extended writing: describe the process of distillation ● Extended writing: explain why distillation separates substances. ● Explain what happens to substances during the process of distillation in terms of intermolecular forces of attraction. ● Extended writing: describe the processes of ● phytomining ● bioleaching. ● Evaluate ways of reducing the use of limited resources, given appropriate information. ● Extended writing: describe the environmental impacts of obtaining raw materials from the Earth. ● Describe how to prevent corrosion using the examples: ● oxide coating on aluminium	

		● zinc on iron ● magnesium on steel. ● Use suitable examples to explain why corrosion can be prevented using barriers and the role of sacrificial barriers if appropriate to the example used. ● State properties of examples of alloys. Explain, in relation to the structure, why these alloys have these properties. Research the physical properties of: ● soda-lime glass ● borosilicate glass ● clay ceramics ● low-density poly(ethene) ● high density poly(ethene) ● composites Use these properties to explain how the materials are related to their use. Compare the properties of thermosetting and thermosoftening polymers. ● Using diagrams, describe the structure of the following polymers: ● thermosoftening ● thermosetting. ● Use these diagrams and descriptions to explain why the following happens when heated: ● thermosoftening polymers melt ● thermosetting polymers do not melt. ● (HT only) Interpret graphs of reaction conditions versus rate. ● (HT only) Apply the principles of dynamic equilibrium to the Haber process. ● (HT only) Explain the trade-off between rate of production and position of equilibrium. ● (HT only) Explain how the commercially used conditions for the Haber process are related to the availability and cost of raw materials and energy supplies, control of equilibrium position and rate. ● Write a balanced symbol equation for the manufacture of ammonia. Use this to	

		describe the reaction in terms of reactants, products, conditions and number of moles. ● Recall the following topics: ● dynamic equilibrium ● temperature affecting the rate of a reaction ● pressure. ● Explain how each of these affects the Haber process reaction. ● Discuss the effect of the following conditions on the reaction: ● a high temperature ● a low temperature ● a high pressure ● a low pressure ● use of a catalyst ● no catalyst. ● Discuss the pros and cons of these varying conditions. ● Explain the trade-off between the rate of the reaction and the position of the equilibrium. ● Explain how the conditions used in industry affect the equilibrium position, rate and costs of the reaction.	
Vocabulary		Pure Finite Renewable Potable water Chlorination Sewage Thermosoftening polymer Thermosetting polymer Composites Ceramics Corrosion Rusting Sacrificial protection Alloys Haber process Equilibrium	●

		Compromise	
Assessment		Blue Sheet Assessment for C10 and end of topic test.	