

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 in 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 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	<p>Recall what homeostasis is and why it is important.</p> <p>Recall examples of conditions that need to be controlled.</p> <p>Recall the roles of the nervous system and the endocrine system in homeostasis.</p> <p>Recall the main components of a control system and their functions.</p> <p>Recall the functions of the main structures in the nervous system.</p> <p>Recall the differences between voluntary and reflex actions.</p> <p>Recall the stages of a reflex action</p> <p>Describe the endocrine system</p> <p>Recall the term hormone.</p>	<ul style="list-style-type: none"> 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: <ul style="list-style-type: none"> methane ethane propane butane. Define the term saturated 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. 	<ul style="list-style-type: none"> 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 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

	<p>Recall the locations of organs in the endocrine system.</p> <p>Recall why the pituitary gland is often called the master gland.</p> <p>Recall how blood glucose concentration is monitored and controlled.</p> <p>Recall when insulin is produced and how it helps to control blood glucose levels.</p> <p>Recall glycogen as a stored carbohydrate.</p> <p>Recall the cause, treatment and problems associated with Type 2 diabetes.</p> <p>Recall the terms hormonal and non-hormonal methods of contraception.</p> <p>Recall the use of fertility drugs in women with low FSH levels.</p> <p>Recall where and when adrenaline is released and its target organs.</p> <p>Recall the effects of adrenaline on the body.</p> <p>Recall where thyroxine is produced and its effects on the body.</p> <p>Triple Science Biology Only</p> <p>Identify the cerebral cortex, cerebellum and medulla on a diagram and recall the function of each.</p>	<ul style="list-style-type: none"> • Write balanced equations for the complete combustion of hydrocarbons with a given formula. • Knowledge of trends in properties of hydrocarbons is limited to: <ul style="list-style-type: none"> • 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 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. 	<ul style="list-style-type: none"> • 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. • 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)
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	<p>Label a diagram of the eye and describe the function of each structure.</p> <p>Define the term 'accommodation'.</p> <p>Recall different methods to measure body temperature.</p> <p>Recall how body temperature is monitored and controlled.</p> <p>Describe where water, ions and urea are lost from the body.</p> <p>Label a diagram of the excretory system.</p> <p>Recall the advantages and disadvantages of a kidney transplant.</p> <p>Recall how a kidney machine works.</p> <p>Recall how plant shoots and roots respond to light and gravity.</p> <p>Recall the role of auxin in plant responses in terms of unequal distribution in shoots and roots.</p> <p>Recall how auxins are used as weed killers and rooting powders, and to promote growth in tissue culture.</p>	<ul style="list-style-type: none"> • 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. 	<ul style="list-style-type: none"> • 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	<p>Explain the importance of being able to respond to environmental changes and coordinate behaviour.</p>	<ul style="list-style-type: none"> • Plot boiling points of alkanes against number of carbons. • Explain how fractional distillation works in terms of evaporation and condensation. 	<ul style="list-style-type: none"> • Use an equation to find an unknown variable • Draw scale diagrams • Calculate the resultant of parallel forces • Calculate the extension of a linear object

	<p>Explain how the nervous system is adapted for its functions.</p> <p>Explain the role of chemicals at synapses.</p> <p>Describe and use different methods to measure reaction time.</p> <p>Explain the importance of reflex actions and give examples.</p> <p>Compare the actions of the nervous and endocrine systems.</p> <p>Compare the causes, and treatments of Type 1 and Type 2 diabetes.</p> <p>Recall secondary sexual characteristics of boys and girls.</p> <p>Recall the cause of these changes in boys and girls and their relevance in reproduction.</p> <p>Describe the menstrual cycle and fertility including the role of hormones.</p> <p>Explain how hormonal and non-hormonal contraceptives work.</p> <p>Explain the process of In Vitro Fertilisation (IVF).</p> <p>Explain how levels of adrenaline are controlled by a negative feedback system.</p> <p>Explain how its release is stimulated by thyroid stimulating hormone and the levels of these two hormones are controlled by a negative feedback system.</p>	<ul style="list-style-type: none"> • 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: <ul style="list-style-type: none"> • ethene • propene • butene • pentene. <ul style="list-style-type: none"> • Explain why carboxylic acids are weak acids in terms of ionisation and pH. <p>Draw the covalent bonding in:</p> <ul style="list-style-type: none"> • methanoic acid • ethanoic acids • propanoic acid • butanoic acid. 	<ul style="list-style-type: none"> • 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
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	<p>Triple Science Biology Only</p> <p>Describe how the eye changes to focus on near and distant objects.</p> <p>Complete simple ray diagrams to show normal vision, long-sightedness and short-sightedness</p> <p>Describe and explain the changes that happen when body temperature is too high or too low.</p> <p>Explain why we drink more fluid during hot weather.</p> <p>Explain why there is no control over water, ion and urea loss by the lungs and skin.</p> <p>Explain when cells might gain or lose too much water, in terms of osmosis (links to B1)).</p> <p>Describe the effect of too much or too little water on cells.</p> <p>Explain how the body responds to different temperature and osmotic challenges in terms of sweat and urine release.</p> <p>Describe how urine is produced.</p> <p>Describe the absorption of glucose and ions by diffusion and active transport (link to B1).</p> <p>Explain why dialysis fluid contains sugar and ions at the same concentration as normal blood, but no urea.</p> <p>Evaluate the use of kidney transplants and dialysis to treat kidney failure.</p>	<p>Describe what happens to one of the first four acids during the reactions:</p> <ul style="list-style-type: none"> • 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. <ul style="list-style-type: none"> • Describe what takes place during condensation polymerisation. • Identify monomers, polymers and repeating units. • Describe the polymerisation of ethane-1,2-diol and hexanedioic acid. 	
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	<p>Explain the role of auxin in plant responses in terms of unequal distribution in shoots and roots.</p> <p>Describe the use of ethene to control the ripening of fruit during storage and transport.</p> <p>Describe the use of gibberellins to end seed dormancy, promote flowering and to increase fruit size.</p>		
Vocabulary	<p>Homeostasis</p> <p>Receptor</p> <p>Nervous system</p> <p>Reflex</p> <p>Biodiversity</p> <p>Menstrual Cycle</p> <p>Endocrine</p> <p>Triple Science Only</p> <p>Cortex</p> <p>Cerebellum</p> <p>Medulla</p> <p>Retina</p> <p>Sclera</p> <p>Cornea</p> <p>Iris</p> <p>Ciliary muscles</p> <p>Suspensory ligaments</p> <p>Accommodation</p> <p>Myopia</p> <p>Hyperopia</p> <p>Auxin</p> <p>Gibberellins</p> <p>Ethene</p>	<p>Hydrocarbons</p> <p>Alkanes</p> <p>Cracking</p> <p>Saturated</p> <p>Unsaturated</p> <p>Fractional Distillation</p> <p>Condensing</p> <p>boiling point</p> <p>Alkenes</p> <p>Displayed structure</p> <p>properties</p> <p>Alcohols</p> <p>Carboxylic Acids</p> <p>Addition Reactions</p> <p>Polymerisation</p> <p>proteins</p> <p>intermolecular</p>	<ul style="list-style-type: none"> • 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 • velocity • braking distance • conservation of momentum • elastic • extension • gravitational field strength, g • inertia • limit of proportionality • momentum • Newton's second law of motion

			<ul style="list-style-type: none"> • 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	<p>Recall sexual reproduction produces variation in the offspring, but asexual reproduction does not.</p> <p>Recall sexual reproduction in animals and plants.</p> <p>Recall the term clone.</p> <p>Recall cuttings as clones of plants.</p> <p>Define meiosis.</p> <p>Describe the process of meiosis to include the number of chromosomes at each stage.</p> <p>Define fertilisation.</p> <p>Describe using a Punnett square and genetic diagram how sex is determined in humans.</p> <p>Define the term gametes and describe their genetic material.</p> <p>Draw diagrams to explain how gametes are formed in meiosis.</p> <p>Recall the number of chromosomes in the gametes during meiosis and fertilisation.</p> <p>Recall that plants can reproduce sexually to produce seeds and asexually by runners.</p> <p>Recall the structure of chromosomes, DNA and genes.</p>	<ul style="list-style-type: none"> • Define the terms: <ul style="list-style-type: none"> • 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: <ul style="list-style-type: none"> • 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. • 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. 	<ul style="list-style-type: none"> • 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

	<p>Recall that a gene is a small section of DNA that codes for a particular sequence of amino acids to make a specific protein.</p> <p>Define the term genome.</p> <p>Recall what a mutation is.</p> <p>Give examples of characteristics controlled by a single gene and describe their alleles.</p> <p>Give examples of characteristics controlled by multiple genes.</p> <p>Define and use the terms: gametes, genotype, phenotype, dominant recessive, homozygous and heterozygous.</p> <p>Describe the inherited disorders polydactyly and cystic fibrosis.</p> <p>Define the term genetic engineering.</p> <p>Recall the process of genetic engineering and its advantages.</p> <p>Recall plant cloning techniques to include:</p> <ul style="list-style-type: none"> · taking plant cuttings · tissue culture. <p>Explain why identical twins are clones.</p> <p>Describe animal cloning techniques to include:</p> <ul style="list-style-type: none"> · embryo transplants · adult cell cloning. <p>Recall classification of characteristics as being due to genetic, environmental or a combination of these causes.</p> <p>Recall examples of continuous and discontinuous variation.</p>	<ul style="list-style-type: none"> • 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. 	
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	<p>Recall why humans selectively breed plants and animals.</p> <p>Recall selective breeding as a type of sexual reproduction.</p> <p>Describe the process of selective breeding and give examples.</p> <p>Describe evolution by Darwin's theory of natural selection, recalling the main stages of natural selection.</p> <p>Recall why mutation may lead to more rapid change in a species.</p> <p>Define the term species.</p> <p>Identify organisms that are of different species.</p> <p>Recall the work of Alfred Russel Wallace on natural selection.</p> <p>Recall the work of Jean-Baptiste Lamarck.</p> <p>Define the terms inherited and acquired characteristics.</p> <p>Recall types of evidence for the theory of evolution by natural selection.</p> <p>Define the term 'fossil'.</p> <p>Recall how fossils may be formed.</p> <p>Define the term extinction.</p> <p>Explain how extinction may be caused.</p> <p>Triple Science Biology Only</p> <p>Recall advantages and disadvantages of asexual and sexual reproduction.</p> <p>Explain the structure of DNA using diagrams and models.</p>		
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	<p>Recall how the bases on the two strands link together.</p> <p>Describe some of the experiments carried out by Mendel using pea plants.</p> <p>Recall a timeline showing the main developments in the understanding of inheritance</p> <p>Recall the work of Wallace.</p>		
Apply	<p>Explain why sexual reproduction produces variation in the offspring, but asexual reproduction does not.</p> <p>Explain why sexual reproduction results in variety.</p> <p>Compare mitosis and meiosis</p> <p>Describe advantages and disadvantages of sexual and asexual reproduction.</p> <p>Describe some organisms that can reproduce by both methods (Malarial parasite and types of fungi).</p> <p>Explain using a Punnett square and genetic diagram how sex is determined in humans.</p> <p>Explain the probability of having a child that is a boy or a girl.</p> <p>Explain how knowledge of the human genome will help medicine in the future.</p> <p>Explain the ethical issues related to DNA sequencing.</p> <p>Use genetic cross diagrams to explain inheritance and carriers.</p> <p>Make informed judgements about the economic, social and ethical issues concerning embryo screening.</p>	<ul style="list-style-type: none"> • 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. <p>Explain, in terms of intermolecular forces, the terms:</p> <ul style="list-style-type: none"> • melting point • boiling point. <ul style="list-style-type: none"> • 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. 	<ul style="list-style-type: none"> • 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.

	<p>Describe the use of genetic modification to treat genetic disorders.</p> <p>Explain why Mendel proposed the idea of separately inherited factors and why the importance of this discovery was not recognised until after his death.</p> <p>Predict and explain the outcome of crosses using genetic diagrams based on Mendel's experiments and using unfamiliar information.</p> <p>Evaluate the use of genetic engineering in medicine, eg in gene therapy and production of hormones and some vaccines.</p> <p>Interpret information about genetic engineering techniques.</p> <p>Make informed judgements about the economic, social and ethical issues concerning genetic engineering and GM crops.</p> <p>Explain the importance of cloning to plant growers.</p> <p>Interpret information about plant cloning techniques.</p> <p>Explain advantages and disadvantages of plant cloning techniques.</p> <p>Evaluate arguments for and against human cloning.</p> <p>Make informed judgements about the economic, social and ethical issues concerning cloning.</p> <p>Explain the benefits and risks of selective breeding in plants and animals.</p> <p>Interpret evolutionary trees</p> <p>Identify differences between Darwin's theory of evolution and conflicting theories.</p>	<ul style="list-style-type: none"> • 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 	
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	<p>Suggest reasons for the different theories.</p> <p>Explain why scientists cannot be certain how life began on Earth.</p> <p>Explain how fossils provide evidence for evolution.</p> <p>Explain what we should do to slow down the rate of development of resistant strains of bacteria (Link to B3).</p> <p>Explain that organisms become extinct because something changes and the species cannot adapt quickly enough to the new circumstances.</p> <p>Triple Science Biology Only</p> <p>Describe in simple terms how a protein is synthesised.</p> <p>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).</p> <p>Explain how new species arise using the terms:</p> <p>isolation</p> <p>genetic variation</p> <p>natural selection</p> <p>speciation.</p>		
Vocabulary	<p>Asexual</p> <p>Sexual</p> <p>Meiosis</p> <p>DNA</p> <p>Genome</p>	<p>Pure</p> <p>Formulation</p> <p>Compounds</p> <p>Mixtures</p> <p>Chromatography</p>	<ul style="list-style-type: none"> • alternator • dynamo • electromagnet • electromagnetic induction • Fleming's left-hand rule

	Double Helix Bases Chromosomes Variation Evolution Selective breeding Cloning Extinct Resistance bacteria Linnean	Retention Factor (Rf) Stationary phase Mobile phase Solubility Insoluble Positive ions Negative ions Cations Anions Flame emission Spectroscopy	<ul style="list-style-type: none"> 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		<ul style="list-style-type: none"> 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. 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. 	<ul style="list-style-type: none"> 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'

		<ul style="list-style-type: none"> • 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. <p>Describe how emissions can be reduced. Suggest the consequences of the reductions</p>	
Apply		<ul style="list-style-type: none"> • 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. <p>Predict the products of combustion of a fuel given appropriate information about the</p> <ul style="list-style-type: none"> • composition of the fuel and the conditions in which it is used. • Describe the effect of the following products: <ul style="list-style-type: none"> • 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. 	<ul style="list-style-type: none"> •

		<p>Particulates on human health problems</p> <ul style="list-style-type: none"> 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: <ul style="list-style-type: none"> carbon dioxide carbon monoxide soot water vapour sulfur dioxide oxides of nitrogen. 	
Vocabulary		Crust Mantle Core Atmosphere Greenhouse effect Long wave radiation	<ul style="list-style-type: none"> Big Bang theory black dwarf black hole centripetal force cosmic microwave background radiation (CMBR)

		Short wave radiation Pollutants Methane Carbon dioxide Greenhouse gases particulates Climate change Weather Climate Carbon footprint	<ul style="list-style-type: none"> • 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		<ul style="list-style-type: none"> • 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: <ul style="list-style-type: none"> • finite • renewable. <ul style="list-style-type: none"> • 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: <ul style="list-style-type: none"> • potable water • pure water. <ul style="list-style-type: none"> • 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 	<ul style="list-style-type: none"> •

		<ul style="list-style-type: none"> • Define the following terms using suitable examples: <ul style="list-style-type: none"> • corrosion • rusting • sacrificial protection. <ul style="list-style-type: none"> • Describe how to prevent corrosion using the examples: • oxide coating on aluminium • zinc on iron • magnesium on steel. <ul style="list-style-type: none"> • 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. <ul style="list-style-type: none"> • 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 	
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		<ul style="list-style-type: none"> • • Compare the industrial production of fertilisers with laboratory preparations of the same compounds, given appropriate information. 	
Apply		<ul style="list-style-type: none"> • . 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: <ul style="list-style-type: none"> • phytomining • bioleaching. <ul style="list-style-type: none"> • Include percentage of metal extracted, concentration of global warming gases released, amount of electricity used etc. <p>Use this data in an evaluation.</p> <ul style="list-style-type: none"> • 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: <ul style="list-style-type: none"> • soda-lime glass • borosilicate glass • clay ceramics • low-density poly(ethene) • high density poly(ethene) • composites. <ul style="list-style-type: none"> • Using diagrams, describe the structure of the following polymers: • thermosoftening • thermosetting. 	<ul style="list-style-type: none"> •

		<ul style="list-style-type: none"> • Use these diagrams and descriptions to explain why the following happens when heated: • thermosoftening polymers melt • thermosetting polymers do not melt. <ul style="list-style-type: none"> • 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. <ul style="list-style-type: none"> • 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. <ul style="list-style-type: none"> • Use suitable examples to explain why corrosion can be prevented using barriers and the role of sacrificial barriers if appropriate to the example used. 	
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- 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

		<ul style="list-style-type: none"> • pressure. <ul style="list-style-type: none"> • Explain how each of these affects the Haber process reaction. • Discuss the effect of the following conditions on the reaction: <ul style="list-style-type: none"> • a high temperature • a low temperature <ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> •
Assessment		Blue Sheet Assessment for C10 and end of topic test.	

