

Autumn 01	Autumn 02	Spring 01
<p>Content:</p> <p>Topic B2: organisation</p> <p>In this section we will learn about the human digestive system which provides the body with nutrients and the respiratory system that provides it with oxygen and removes carbon dioxide. In each case they provide dissolved materials that need to be moved quickly around the body in the blood by the circulatory system. Damage to any of these systems can be debilitating if not fatal. Although there has been huge progress in surgical techniques, especially with regard to coronary heart disease, many interventions would not be necessary if individuals reduced their risks through improved diet and lifestyle. We will also learn how the plant's transport system is dependent on environmental conditions to ensure that leaf cells are provided with the water and carbon dioxide that they need for photosynthesis.</p> <p>Topic C2: bonding, structure and the properties of matter</p> <p>Chemists use theories of structure and bonding to explain the physical and chemical properties of materials. Analysis of structures shows that atoms can be arranged in a variety of ways, some of which are molecular while others are giant structures. Theories of bonding explain how atoms are held together in these structures. Scientists use this knowledge of structure and bonding to engineer new materials with desirable properties. The properties of these materials may offer new applications in a range of different technologies.</p> <p>Working scientifically skills and oracy opportunity:</p> <p>Required practical food tests</p> <p>Required practical enzymes</p>	<p>Content:</p> <p>Topic P2: electricity</p> <p>Electric charge is a fundamental property of matter everywhere. Understanding the difference in the microstructure of conductors, semiconductors and insulators makes it possible to design components and build electric circuits. Many circuits are powered with mains electricity, but portable electrical devices must use batteries of some kind. Electrical power fills the modern world with artificial light and sound, information and entertainment, remote sensing and control. The fundamentals of electromagnetism were worked out by scientists of the 19th century. However, power stations, like all machines, have a limited lifetime. If we all continue to demand more electricity this means building new power stations in every generation – but what mix of power stations can promise a sustainable future?</p> <p>Topic B3: infection and response</p> <p>Pathogens are microorganisms such as viruses and bacteria that cause infectious diseases in animals and plants. They depend on their host to provide the conditions and nutrients that they need to grow and reproduce. They frequently produce toxins that damage tissues and make us feel ill. This section will explore how we can avoid diseases by reducing contact with them, as well as how the body uses barriers against pathogens. Once inside the body our immune system is triggered which is usually strong enough to destroy the pathogen and prevent disease. When at risk from unusual or dangerous diseases our body's natural system can be enhanced by the use of vaccination. Since the 1940s a range of antibiotics have been developed which have proved successful against a number of lethal diseases caused by bacteria. Unfortunately, many groups of bacteria have now become resistant to these antibiotics. The race is now on to develop a new set of antibiotics.</p> <p>Working scientifically skills and oracy opportunity:</p> <p>Required practical resistance</p>	<p>Content:</p> <p>Topic C3: quantitative chemistry</p> <p>Chemists use quantitative analysis to determine the formulae of compounds and the equations for reactions. Given this information, analysts can then use quantitative methods to determine the purity of chemical samples and to monitor the yield from chemical reactions. Chemical reactions can be classified in various ways. Identifying different types of chemical reaction allows chemists to make sense of how different chemicals react together, to establish patterns and to make predictions about the behaviour of other chemicals. Chemical equations provide a means of representing chemical reactions and are a key way for chemists to communicate chemical ideas.</p> <p>Topic P3: particle model of matter</p> <p>The particle model is widely used to predict the behaviour of solids, liquids and gases and this has many applications in everyday life. It helps us to explain a wide range of observations and engineers use these principles when designing vessels to withstand high pressures and temperatures, such as submarines and spacecraft. It also explains why it is difficult to make a good cup of tea high up a mountain!</p> <p>Working scientifically skills and oracy opportunity:</p> <p>Required practical density</p>

	Required practical IV characteristics	
Assessment objectives: 4.2.1.0 Principles of organisation 4.2.2.1 The human digestive system 4.2.2.2 The heart and blood vessels 4.2.2.3 Blood 4.2.2.4 Coronary heart disease: a non-communicable disease 4.2.2.5 Health issues 4.2.2.6 The effect of lifestyle on some non-communicable diseases 4.2.2.7 Cancer 4.2.3.1 Plant tissues 4.2.3.2 Plant organ system 4.2.1.1 Chemical bonds 4.2.1.2 Ionic bonding 4.2.1.3 Ionic compounds 4.2.1.4 Covalent bonding 4.2.1.5 Metallic bonding 4.2.2.1 The three states of matter 4.2.2.2 State symbols 4.2.2.3 Properties of ionic compounds 4.2.2.4 Properties of small molecules 4.2.2.5 Polymers 4.2.2.6 Giant covalent structures 4.2.2.7 Properties of metals and alloys 4.2.2.8 Metals as conductors 4.2.3.1 Diamond 4.2.3.2 Graphite 4.2.3.3 Graphene and fullerenes 4.2.4.1 Sizes of particles and their properties (chemistry only) 4.2.4.2 Uses of nanoparticles (chemistry only) End of topic tests in topics studied Big test 1: Exam of summary of B1, C1, P1 topics	Assessment objectives: 4.2.1.1 Standard circuit diagram symbols 4.2.1.2 Electrical charge and current 4.2.1.3 Current, resistance and potential difference 4.2.1.4 Resistors 4.2.2.0 Series and parallel circuits 4.2.3.1 Direct and alternating potential difference 4.2.3.2 Mains electricity 4.2.4.1 Power 4.2.4.2 Energy transfers in everyday appliances 4.2.4.3 The National Grid 4.2.5.1 Static charge (physics only) 4.2.5.2 Electric fields (physics only) 4.3.1.1 Communicable (infectious) diseases 4.3.1.2 Viral diseases 4.3.1.3 Bacterial diseases 4.3.1.4 Fungal diseases 4.3.1.5 Protist diseases 4.3.1.6 Human defence systems 4.3.1.7 Vaccination 4.3.1.8 Antibiotics and painkillers 4.3.1.9 Discovery and development of drugs 4.3.2.1 Producing monoclonal antibodies (biology only) 4.3.2.2 Uses of monoclonal antibodies (biology only) 4.3.3.1 Detection and identification of plant diseases (biology only) 4.3.3.2 Plant defence responses (biology only) End of topic tests in topics studied	Assessment objectives: 4.3.1.1 Conservation of mass and balanced chemical equations 4.3.1.2 Relative formula mass 4.3.1.3 Mass changes when a reactant or product is a gas 4.3.1.4 Chemical measurements 4.3.2.1 Moles 4.3.2.2 Amounts of substances in equations 4.3.2.3 Using moles to balance equations 4.3.2.4 Limiting reactants 4.3.2.5 Concentration of solutions 4.3.3.1 Percentage yield (chemistry only) 4.3.3.2 Atom economy (chemistry only) 4.3.4.0 Using concentrations of solutions in mol/dm ³ (chemistry only) 4.3.5.0 Use of amount of substance in relation to volumes of gases (chemistry only) 4.3.1.1 Density of materials 4.3.1.2 Changes of state 4.3.2.1 Internal energy 4.3.2.2 Temperature changes in a system and specific heat capacity 4.3.2.3 Changes of state and specific latent heat 4.3.3.1 Particle motion in gases 4.3.3.2 Pressure in gases (physics only) 4.3.3.3 Increasing the pressure of a gas (physics only) End of topic tests in topics studied
Spring 02	Summer 01	Summer 02

<p>Content:</p> <p>Topic B4: bioenergetics In this section we will explore how plants harness the Sun's energy in photosynthesis in order to make food. This process liberates oxygen which has built up over millions of years in the Earth's atmosphere. Both animals and plants use this oxygen to oxidise food in a process called aerobic respiration which transfers the energy that the organism needs to perform its functions. Conversely, anaerobic respiration does not require oxygen to transfer energy. During vigorous exercise the human body is unable to supply the cells with sufficient oxygen and it switches to anaerobic respiration. This process will supply energy but also causes the build-up of lactic acid in muscles which causes fatigue.</p> <p>Topic C4: chemical changes Understanding of chemical changes began when people began experimenting with chemical reactions in a systematic way and organising their results logically. Knowing about these different chemical changes meant that scientists could begin to predict exactly what new substances would be formed and use this knowledge to develop a wide range of different materials and processes. It also helped biochemists to understand the complex reactions that take place in living organisms. The extraction of important resources from the Earth makes use of the way that some elements and compounds react with each other and how easily they can be 'pulled apart'.</p> <p>Working scientifically skills and oracy opportunity: Required practical photosynthesis Required practical making salts Required practical electrolysis</p>	<p>Content:</p> <p>Topic P4: atomic structure Ionising radiation is hazardous but can be very useful. Although radioactivity was discovered over a century ago, it took many nuclear physicists several decades to understand the structure of atoms, nuclear forces and stability. Early researchers suffered from their exposure to ionising radiation. Rules for radiological protection were first introduced in the 1930s and subsequently improved. Today radioactive materials are widely used in medicine, industry, agriculture and electrical power generation</p> <p>Topic C5: energy changes Energy changes are an important part of chemical reactions. The interaction of particles often involves transfers of energy due to the breaking and formation of bonds. Reactions in which energy is released to the surroundings are exothermic reactions, while those that take in thermal energy are endothermic. These interactions between particles can produce heating or cooling effects that are used in a range of everyday applications. Some interactions between ions in an electrolyte result in the production of electricity. Cells and batteries use these chemical reactions to provide electricity. Electricity can also be used to decompose ionic substances and is a useful means of producing elements that are too expensive to extract any other way</p> <p>Working scientifically skills and oracy opportunity: Required practical temperature changes</p>	<p>Content:</p> <p>Topic C9: chemistry of the atmosphere The Earth's atmosphere is dynamic and forever changing. The causes of these changes are sometimes man-made and sometimes part of many natural cycles. Scientists use very complex software to predict weather and climate change as there are many variables that can influence this. The problems caused by increased levels of air pollutants require scientists and engineers to develop solutions that help to reduce the impact of human activity.</p> <p>Topic C10: using resources Industries use the Earth's natural resources to manufacture useful products. In order to operate sustainably, chemists seek to minimise the use of limited resources, use of energy, waste and environmental impact in the manufacture of these products. Chemists also aim to develop ways of disposing of products at the end of their useful life in ways that ensure that materials and stored energy are utilised. Pollution, disposal of waste products and changing land use has a significant effect on the environment, and environmental chemists study how human activity has affected the Earth's natural cycles, and how damaging effects can be minimised.</p> <p>Working scientifically skills and oracy opportunity: Required practical water purification</p>
<p>Assessment objectives:</p> <p>4.4.1.1 Photosynthetic reaction 4.4.1.2 Rate of photosynthesis 4.4.1.3 Uses of glucose from photosynthesis 4.4.2.1 Aerobic and anaerobic respiration 4.4.2.2 Response to exercise</p>	<p>Assessment objectives:</p> <p>4.4.1.1 The structure of an atom 4.4.1.2 Mass number, atomic number and isotopes 4.4.1.3 The development of the model of the atom 4.4.2.1 Radioactive decay and nuclear radiation 4.4.2.2 Nuclear equations 4.4.2.3 Half-lives and the random nature of radioactive decay</p>	<p>Assessment objectives:</p> <p>4.9.1.1 The proportions of different gases in the atmosphere 4.9.1.2 The Earth's early atmosphere 4.9.1.3 How oxygen increased 4.9.1.4 How carbon dioxide decreased 4.9.2.1 Greenhouse gases 4.9.2.2 Human activities which contribute to an increase in greenhouse gases in the atmosphere</p>

4.4.2.3 Metabolism 4.4.1.1 Metal oxides 4.4.1.2 The reactivity series 4.4.1.3 Extraction of metals and reduction 4.4.1.4 Oxidation and reduction in terms of electrons 4.4.2.1 Reactions of acids with metals 4.4.2.2 Neutralisation of acids and salt production 4.4.2.3 Soluble salts 4.4.2.4 The pH scale and neutralisation 4.4.2.5 Titrations (chemistry only) 4.4.2.6 Strong and weak acids 4.4.3.1 The process of electrolysis 4.4.3.2 Electrolysis of molten ionic compounds 4.4.3.3 Using electrolysis to extract metals 4.4.3.4 Electrolysis of aqueous solutions 4.4.3.5 Representation of reactions at electrodes as half equations End of topic tests in topics studied Big test 2: Mid Year Exam	4.4.2.4 Radioactive contamination 4.4.3.1 Background radiation (physics only) 4.4.3.2 Different half-lives of radioactive isotopes (physics only) 4.4.3.3 Uses of nuclear radiation (physics only) 4.4.4.1 Nuclear fission (physics only) 4.4.4.2 Nuclear fusion (physics only) 4.5.1.1 Energy transfer during exothermic and endothermic reactions 4.5.1.2 Reaction profiles 4.5.1.3 The energy change of reactions 4.5.2.1 Cells and batteries (chemistry only) 4.5.2.2 Fuel cells (chemistry only) End of topic tests in topics studied	4.9.2.3 Global climate change 4.9.2.4 The carbon footprint and its reduction 4.9.3.1 Atmospheric pollutants from fuels 4.9.3.2 Properties and effects of atmospheric pollutants 4.10.1.1 Using the Earth's resources and sustainable development 4.10.1.2 Potable water 4.10.1.3 Waste water treatment 4.10.1.4 Alternative methods of extracting metals 4.10.2.1 Life cycle assessment 4.10.2.2 Ways of reducing the use of resources 4.10.3.1 Corrosion and its prevention (chemistry only) 4.10.3.2 Alloys as useful materials (chemistry only) 4.10.3.3 Ceramics, polymers and composites (chemistry only) 4.10.4.1 The Haber process (chemistry only) 4.10.4.2 Production and uses of NPK fertilisers (chemistry only) End of topic tests in topics studied Big test 3: Full mock papers: Biology Paper 1, Chemistry Paper 1, Physics Paper 1
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<i>Autumn 01</i>	<i>Autumn 02</i>	<i>Spring 01</i>
<p>Content:</p> <p>Topic C6: the rate and extent of chemical change Chemical reactions can occur at vastly different rates. Whilst the reactivity of chemicals is a significant factor in how fast chemical reactions proceed, there are many variables that can be manipulated in order to speed them up or slow them down. Chemical reactions may also be reversible and therefore the effect of different variables needs to be established in order to identify how to maximise the yield of desired product. Understanding energy changes that accompany chemical reactions is important for this process. In industry, chemists and chemical engineers determine the effect of different variables on reaction rate and yield of product. Whilst there may be compromises to be made, they carry out optimisation processes to ensure that enough product is produced within a sufficient time, and in an energy-efficient way.</p> <p>Topic P5: forces Engineers analyse forces when designing a great variety of machines and instruments, from road bridges and fairground rides to atomic force microscopes. Anything mechanical can be analysed in this way. Recent developments in artificial limbs use the analysis of forces to make movement possible.</p> <p>Working scientifically skills and oracy opportunity:</p> <p>Required practical rates of reaction Required practical force and extension Required practical acceleration</p>	<p>Content:</p> <p>Topic B5: homeostasis Cells in the body can only survive within narrow physical and chemical limits. They require a constant temperature and pH as well as a constant supply of dissolved food and water. In order to do this the body requires control systems that constantly monitor and adjust the composition of the blood and tissues. These control systems include receptors which sense changes and effectors that bring about changes. In this section we will explore the structure and function of the nervous system and how it can bring about fast responses. We will also explore the hormonal system which usually brings about much slower changes. Hormonal coordination is particularly important in reproduction since it controls the menstrual cycle. An understanding of the role of hormones in reproduction has allowed scientists to develop not only contraceptive drugs but also drugs which can increase fertility.</p> <p>Topic C7: organic chemistry The chemistry of carbon compounds is so important that it forms a separate branch of chemistry. A great variety of carbon compounds is possible because carbon atoms can form chains and rings linked by C-C bonds. This branch of chemistry gets its name from the fact that the main sources of organic compounds are living, or once-living materials from plants and animals. These sources include fossil fuels which are a major source of feedstock for the petrochemical industry. Chemists are able to take organic molecules and modify them in many ways to make new and useful materials such as polymers, pharmaceuticals, perfumes and flavourings, dyes and detergents.</p>	<p>Content:</p> <p>Topic P6: waves Wave behaviour is common in both natural and man-made systems. Waves carry energy from one place to another and can also carry information. Designing comfortable and safe structures such as bridges, houses and music performance halls requires an understanding of mechanical waves. Modern technologies such as imaging and communication systems show how we can make the most of electromagnetic waves.</p> <p>Topic B6: inheritance, variation and evolution In this section we will discover how the number of chromosomes are halved during meiosis and then combined with new genes from the sexual partner to produce unique offspring. Gene mutations occur continuously and on rare occasions can affect the functioning of the animal or plant. These mutations may be damaging and lead to a number of genetic disorders or death. Very rarely a new mutation can be beneficial and consequently, lead to increased fitness in the individual. Variation generated by mutations and sexual reproduction is the basis for natural selection; this is how species evolve. An understanding of these processes has allowed scientists to intervene through selective breeding to produce livestock with favoured characteristics. Once new varieties of plants or animals have been produced it is possible to clone individuals to produce larger numbers of identical individuals all carrying the favourable characteristic. Scientists have now discovered how to take genes from one species and introduce them into the genome of another by a process called genetic engineering. In spite of the huge potential benefits that this technology can offer, genetic modification still remains highly controversial.</p> <p>Topic C8: chemical analysis Analysts have developed a range of qualitative tests to detect specific chemicals. The tests are based on reactions that produce</p>

	<p>Working scientifically skills and oracy opportunity: Required practical reaction times</p>	<p>a gas with distinctive properties, or a colour change or an insoluble solid that appears as a precipitate. Instrumental methods provide fast, sensitive and accurate means of analysing chemicals, and are particularly useful when the amount of chemical being analysed is small. Forensic scientists and drug control scientists rely on such instrumental methods in their work.</p> <p>Working scientifically skills and oracy opportunity: Required practical waves Required practical radiation and absorption</p>
<p>Assessment objectives:</p> <p>4.6.1.1 Calculating rates of reactions 4.6.1.2 Factors which affect the rates of chemical reactions 4.6.1.3 Collision theory and activation energy 4.6.1.4 Catalysts 4.6.2.1 Reversible reactions 4.6.2.2 Energy changes and reversible reactions 4.6.2.3 Equilibrium 4.6.2.4 The effect of changing conditions on equilibrium 4.6.2.5 The effect of changing concentration 4.6.2.6 The effect of temperature changes on equilibrium 4.6.2.7 The effect of pressure changes on equilibrium</p> <p>4.5.1.1 Scalar and vector quantities 4.5.1.2 Contact and non-contact forces 4.5.1.3 Gravity 4.5.1.4 Resultant forces 4.5.2.0 Work done and energy transfer 4.5.3.0 Forces and elasticity 4.5.4.0 Moments, levers and gears (physics only) 4.5.5.1 Pressure in a fluid 4.5.5.2 Atmospheric pressure 4.5.6.1 Describing motion along a line 4.5.6.2 Forces, accelerations and Newton's Laws of motion 4.5.6.3 Forces and braking 4.5.7.1 Momentum is a property of moving objects 4.5.7.2 Conservation of momentum 4.5.7.3 Changes in momentum (physics only)</p> <p>End of topic tests in topics studied</p>	<p>Assessment objectives:</p> <p>4.5.1.0 Homeostasis 4.5.2.1 Structure and function (The human nervous system) 4.5.2.2 The brain (biology only) 4.5.2.3 The eye (biology only) 4.5.2.4 Control of body temperature (biology only) 4.5.3.1 Human endocrine system 4.5.3.2 Control of blood glucose concentration 4.5.3.3 Maintaining water and nitrogen balance in the body (biology only) 4.5.3.4 Hormones in human reproduction 4.5.3.5 Contraception 4.5.3.6 The use of hormones to treat infertility 4.5.3.7 Negative feedback 4.5.4.1 Control and coordination (biology only) 4.5.4.2 Use of plant hormones (biology only)</p> <p>4.7.1.1 Crude oil, hydrocarbons and alkanes 4.7.1.2 Fractional distillation and petrochemicals 4.7.1.3 Properties of hydrocarbons 4.7.1.4 Cracking and alkenes (chemistry only) 4.7.2.1 Structure and formulae of alkenes (chemistry only) 4.7.2.2 Reactions of alkenes (chemistry only) 4.7.2.3 Alcohols (chemistry only) 4.7.2.4 Carboxylic acids (chemistry only) 4.7.3.1 Addition polymerisation (chemistry only) 4.7.3.2 Condensation polymerisation (chemistry only) 4.7.3.3 Amino acids (chemistry only) 4.7.3.4 DNA (deoxyribonucleic acid) and other naturally occurring polymers (chemistry only)</p>	<p>Assessment objectives:</p> <p>4.6.1.1 Transverse and longitudinal waves 4.6.1.2 Properties of waves 4.6.1.3 Reflection of waves (physics only) 4.6.1.4 Sound waves (physics only) 4.6.1.5 Waves for detection and exploration (physics only) 4.6.2.1 Types of electromagnetic waves 4.6.2.2 Properties of electromagnetic waves 1 4.6.2.3 Properties of electromagnetic waves 2 4.6.2.4 Uses and applications of electromagnetic waves 4.6.2.5 Lenses (physics only) 4.6.2.6 Visible light (physics only) 4.6.3.1 Emission and absorption of infrared radiation (physics only) 4.6.3.2 Perfect black bodies and radiation (physics only)</p> <p>4.6.1.1 Sexual and asexual reproduction 4.6.1.2 Meiosis 4.6.1.3 Advantages and disadvantages of sexual and asexual reproduction (biology only) 4.6.1.4 DNA and the genome 4.6.1.5 DNA structure (biology only) 4.6.1.6 Genetic inheritance 4.6.1.7 Inherited disorders 4.6.1.8 Sex determination 4.6.2.1 Variation 4.6.2.2 Evolution 4.6.2.3 Selective breeding 4.6.2.4 Genetic engineering 4.6.2.5 Cloning (biology only) 4.6.3.1 Theory of evolution (biology only)</p>

<p>Baseline Progress check: Combined science, 1 hour exam, summary of Biology Paper 1, Chemistry Paper 1, Physics Paper 1 Separate science, 3 x 1 hour exams, Biology Paper 1, Chemistry Paper 1, Physics Paper 1</p>	<p>End of topic tests in topics studied Big Test 2: Autumn PPE: 75 / 115 minute exams (full mock papers from UL): Biology Paper 1, Chemistry Paper 1, Physics Paper 1</p>	<p>4.6.3.2 Speciation (biology only) 4.6.3.3 The understanding of genetics (biology only) 4.6.3.4 Evidence for evolution 4.6.3.5 Fossils 4.6.3.6 Extinction 4.6.3.7 Resistant bacteria 4.6.4.0 Classification of living organisms 4.8.1.1 Pure substances 4.8.1.2 Formulations 4.8.1.3 Chromatography 4.8.2.1 Test for hydrogen 4.8.2.2 Test for oxygen 4.8.2.3 Test for carbon dioxide 4.8.2.4 Test for chlorine 4.8.3.1 Flame tests (chemistry only) 4.8.3.2 Metal hydroxides (chemistry only) 4.8.3.3 Carbonates (chemistry only) 4.8.3.4 Halides (chemistry only) 4.8.3.5 Sulfates (chemistry only) 4.8.3.6 Instrumental methods (chemistry only) 4.8.3.7 Flame emission spectroscopy (chemistry only)</p> <p>End of topic tests in topics studied</p>
<p>Spring 02</p> <p>Content: Topic P7: magnetism and electromagnetism Electromagnetic effects are used in a wide variety of devices. Engineers make use of the fact that a magnet moving in a coil can produce electric current and also that when current flows around a magnet it can produce movement. It means that systems that involve control or communications can take full advantage of this.</p> <p>Topic B7: biodiversity The Sun is a source of energy that passes through ecosystems. Materials including carbon and water are continually recycled by the living world, being released through respiration of animals, plants and decomposing microorganisms and taken up by plants in photosynthesis. All</p>	<p>Summer 01</p> <p>Content: Revision Including: - walking talking mocks - past papers - making and using flashcards - practice questions - key ideas summaries - required practicals reviews</p>	<p>Summer 02</p> <p>Content: GCSE Exams</p>

species live in ecosystems composed of complex communities of animals and plants dependent on each other and that are adapted to particular conditions, both abiotic and biotic. These ecosystems provide essential services that support human life and continued development. In order to continue to benefit from these services humans need to engage with the environment in a sustainable way. In this section we will explore how humans are threatening biodiversity as well as the natural systems that support it. We will also consider some actions we need to take to ensure our future health, prosperity and well-being.

Topic C10: using resources

Industries use the Earth's natural resources to manufacture useful products. In order to operate sustainably, chemists seek to minimise the use of limited resources, use of energy, waste and environmental impact in the manufacture of these products. Chemists also aim to develop ways of disposing of products at the end of their useful life in ways that ensure that materials and stored energy are utilised. Pollution, disposal of waste products and changing land use has a significant effect on the environment, and environmental chemists study how human activity has affected the Earth's natural cycles, and how damaging effects can be minimised.

Topic P8: space Physics (Separate Science only)

Questions about where we are, and where we came from, have been asked for thousands of years. In the past century, astronomers and astrophysicists have made remarkable progress in understanding the scale and structure of the universe, its evolution and ours. New questions have emerged recently. 'Dark matter', which bends light and holds galaxies together but does not emit electromagnetic radiation, is everywhere – what is it? And what is causing the universe to expand ever faster?

Working scientifically skills and oracy opportunity:

Required practical water purification

Required practical field investigations

Required practical decay (biology only)

Assessment objectives:

- 4.7.1.1 Poles of a magnet
- 4.7.1.2 Magnetic fields
- 4.7.2.1 Electromagnetism
- 4.7.2.2 Fleming's left-hand rule
- 4.7.2.3 Electric motors
- 4.7.2.4 Loudspeakers (physics only)
- 4.7.3.1 Induced potential (physics only)
- 4.7.3.2 Uses of the generator effect (physics only)
- 4.7.3.3 Microphones (physics only)
- 4.7.3.4 Transformers (physics only)

- 4.7.1.1 Communities
- 4.7.1.2 Abiotic factors
- 4.7.1.3 Biotic factors
- 4.7.1.4 Adaptations
- 4.7.2.1 Levels of organisation
- 4.7.2.2 How materials are cycled
- 4.7.2.3 Decomposition (biology only)
- 4.7.2.4 Impact of environmental change (biology only)
- 4.7.3.1 Biodiversity
- 4.7.3.2 Waste management
- 4.7.3.3 Land use
- 4.7.3.4 Deforestation
- 4.7.3.5 Global warming
- 4.7.3.6 Maintaining biodiversity
- 4.7.4.1 Trophic levels (biology only)
- 4.7.4.2 Pyramids of biomass (biology only)
- 4.7.4.3 Transfer of biomass (biology only)
- 4.7.5.1 Factors affecting food security (biology only)
- 4.7.5.2 Farming techniques (biology only)
- 4.7.5.3 Sustainable fisheries (biology only)
- 4.7.5.4 Role of biotechnology (biology only)

- 4.10.1.1 Using the Earth's resources and sustainable development
- 4.10.1.2 Potable water
- 4.10.1.3 Waste water treatment
- 4.10.1.4 Alternative methods of extracting metals
- 4.10.2.1 Life cycle assessment
- 4.10.2.2 Ways of reducing the use of resources
- 4.10.3.1 Corrosion and its prevention (chemistry only)

<p>4.10.3.2 Alloys as useful materials (chemistry only) 4.10.3.3 Ceramics, polymers and composites (chemistry only) 4.10.4.1 The Haber process (chemistry only) 4.10.4.2 Production and uses of NPK fertilisers (chemistry only)</p> <p>4.8.1.1 Our solar system (physics only) 4.8.1.2 The life cycle of a star (physics only) 4.8.1.3 Orbital motion, natural and artificial satellites (physics only) 4.8.2.0 Red-shift (physics only)</p> <p>End of topic tests in topics studied Big Test 3: Spring PPE: 75 / 115 minute exams (full mock papers from UL): Biology Paper 2, Chemistry Paper 2, Physics Paper 2</p>		
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