

<i>Autumn 01</i>	<i>Autumn 02</i>	<i>Spring 01</i>
<p><b>Content:</b> 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><b>Working scientifically skills and oracy opportunity:</b> <b>Required practical rates of reaction</b> <b>Required practical force and extension</b> <b>Required practical acceleration</b></p>	<p><b>Content:</b> 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><b>Working scientifically skills and oracy opportunity:</b> <b>Required practical reaction times</b></p>	<p><b>Content:</b> 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 in to 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 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</p>

		<p>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><b>Assessment objectives:</b></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>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,</p>	<p><b>Assessment objectives:</b></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>End of topic tests in topics studied</p> <p>Big Test 2: Autumn PPE: 75 / 115 minute exams (full mock</p>	<p><b>Assessment objectives:</b></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) 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</p>

<p>Chemistry Paper 1, Physics Paper 1</p>	<p>papers from UL): Biology Paper 1, Chemistry Paper 1, Physics Paper 1</p>	<p>4.6.3.6 Extinction 4.6.3.7 Resistant bacteria 4.6.4.0 Classification of living organisms</p> <p>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>
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<b>Spring 02</b>	<b>Summer 01</b>	<b>Summer 02</b>
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<p><b>Content:</b> 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 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</p>	<p><b>Content:</b> Revision</p> <p>Including:</p> <ul style="list-style-type: none"> <li>- walking talking mocks</li> <li>- past papers</li> <li>- making and using flashcards</li> <li>- practice questions</li> <li>- key ideas summaries</li> <li>- required practicals reviews</li> </ul>	<p><b>Content:</b> GCSE Exams</p>
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<p>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.</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>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?</p> <p>Working scientifically skills and oracy opportunity: Required practical water purification Required practical field investigations Required practical decay (biology only)</p>		
<p><b>Assessment objectives:</b> 4.7.1.1 Poles of a magnet 4.7.1.2 Magnetic fields 4.7.2.1 Electromagnetism</p>		

- 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)
- 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)

<p>4.10.4.2 Production and uses of NPK fertilisers (chemistry only)</p> <p>4.8.1.1 Our solar system (physics only)</p> <p>4.8.1.2 The life cycle of a star (physics only)</p> <p>4.8.1.3 Orbital motion, natural and artificial satellites (physics only)</p> <p>4.8.2.0 Red-shift (physics only)</p> <p>End of topic tests in topics studied</p> <p>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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