YEAR 11 HALF TERM 1 SCIENCE LEARNING PROGRAMME

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Topic	Learning Objectives	Key Vocabulary	Learning Sequence	Linked Learning	Home Learning
Chemical analysis	To understand the concept of a pure substance and how they can be distinguished. To be able to explain and identify formulations. To explain chromatography and calculate R_f values. To know the tests for hydrogen, oxygen, carbon dioxide and chlorine. Identification of ions by chemical and spectroscopic means. (Chemistry only) To identify metal ions from flame tests. To use sodium hydroxide solution to identify metal ions. To use tests to identify carbonate, halide and sulfate ion. To understand the advantages of instrumental methods. To understand the principles behind flame emission spectroscopy.	**Tier 2** **Pure** **Tier 3** **Purity** **Formula** **Formulation** **Cation** **Anion** **Precipitate** **Spectroscope**	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 chemical being analysed is small. Forensic scientists and drug control scientists rely on such instrumental methods in their work.	This GCSE topic builds upon a foundation provided in Year 7 during the Science Skills topic. It also builds upon knowledge pupils have developed during the GCSE curriculum, in the topic of	This will be set as either a Vocabulary test or as consolidation questions on a weekly basis.

YEAR 11 HALF TERM 1 SCIENCE LEARNING PROGRAMME

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Topic	Learning Objectives	Key Vocabulary	Learning Sequence	Linked Learning	Home Learning
Homeostasis	Explain what homeostasis is and the roles of the nervous system and the endocrine system in homeostasis. Explain how the nervous system is adapted for its functions & the role of chemicals at synapses. Describe a reflex action and negative feedback. Describe how the eye changes to focus on near and distant objects. Describe how blood glucose concentration is monitored and controlled. Explain the cause, effects, treatment and problems associated with Type 1 diabetes. Describe the menstrual cycle and fertility including the role of hormones	**Tier 3** **Cerebral cortex** **Medulla** **Cerebellum** **MRI** **Accommodation** **Myopia** **Hyperopia** **Vasodilation** **Vasoconstriction** **Deamination** **Selective reabsorption** **ADH** **Thyroxine**	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.	This GCSE topic builds upon a foundation provided in Year 7 during the Body Systems topic. It also builds upon knowledge pupils have developed during the GCSE curriculum, in the topic of Cells in Year 9.	This will be set as either a Vocabulary test or as consolidation questions on a weekly basis.

YEAR 11 HALF TERM 2 SCIENCE LEARNING PROGRAMME

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Topic	Learning Objectives	Key Vocabulary	Learning Sequence	Linked Learning	Home Learning
The rate and extent of chemical change.	To be able to find, measure and calculate the rate of a reaction given appropriate data. Calculate gradients from tangents to a curve. (HT) Explain how Temperature, Concentration, Pressure, Surface area and a Catalyst effects the rate of reaction. Describe Collision theory. Define the term Activation energy and describe how catalysts change the activation energy required. Explain with the use of an energy profile diagram the effect catalysts have on reactions. To understand that reactions can be reversible and describe the energy changes in reversible reactions. To understand the term equilibrium. To be able to explain the effects of changing conditions on equilibrium., including concentration, temperature and pressure(HT)	**Tier 2** **Particles** **Concentration** **Temperature** **Tier 3** **Rate of Reaction** **Collision Theory** **Activation Energy** **Surface Area** **Catalyst** **Reversible** **Equilibrium** **Exothermic** **Endothermic** **Pressure** **Higher Only:** **Le Chatelier's Principle**	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.	This topic builds upon principles introduced during the Year 78Fast and Furious Topic,. It continues to build upon the fundamental principles of Chemistry covered in Year 9 and 10.	This will be set as either a Vocabulary test or as consolidation questions on a weekly basis.

YEAR 11 HALF TERM 2 SCIENCE LEARNING PROGRAMME

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Topic	Learning Objectives	Key Vocabulary	Learning Sequence	Linked Learning	Home Learning
Waves	Describe the difference between longitudinal and transverse waves Describe the main properties of wave motion Recall and apply the wave speed equation (incl. required practical) Describe examples of the uses and dangers of EM waves Describe and illustrate how different substances may absorb, transmit, refract or reflect electromagnetic waves (Physics only) Describe the propagation of sound waves and its link with human hearing range Describe the use of waves for detection/exploration Compare convex and concave lenses in ray diagrams Explain the effects of filters and the colour of objects Describe the emission and absorption of infrared radiation, and applied to the Earth's temperature Describe the relationship between temperature and emitted radiation	**Tier 2** **Frequency** **Period** **Speed** **Energy** **Absorb** **Reflect** **Tier 3** **Transverse** **Longitudinal** **Amplitude** **Wavelength** **Electromagnetic** **Emit** **Refract** **Radiation dose**	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.	This topic builds on the KS3 topics of: Earth Chemistry (global warming) and Waves (types of wave, wave features, light waves, the eye and seeing, light waves meeting objects, colours, reflection, refraction, lenses and eyesight defects, sound waves, the ear and hearing, ultrasound, wave equations, measuring waves, EM spectrum, IR radiation) This topic has links to the KS4 topics of: Homeostasis and Response (light waves, spectacles, lenses and the eye) Organisation (UV, X-rays, gamma radiation and cancer risk factors) Atomic Structure (gamma radiation) Infection and Response (radiotherapy and monoclonal antibodies) Chemistry of the Atmosphere (greenhouse gases, climate change and temperature of the Earth) Ecology (global warming and temperature of the Earth)	This will be set as either a Vocabulary test or as consolidation questions on a weekly basis.

YEAR 11 HALF TERM 3 SCIENCE LEARNING PROGRAMME

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Topic	Learning Objectives	Key Vocabulary	Learning Sequence	Linked Learning	Home Learning
Organic chemistry	To describe the formation of Crude Oil and its composition as mostly hydrocarbons. To recognise alkanes as having the formula of C_nH_{2n+2}. To describe and explain the process of fractional distillation including their properties in terms of viscosity and flammability. To explain the process of Cracking to make Alkenes and the test for Alkenes. (Chemistry only) To recognise alkenes as having the general formula C_nH_{2n} and to describe the reactions of Alkenes. (Chemistry only) To represent alcohols and carboxylic acids and describe their reactions (Chemistry only) To draw diagrams to represent the formation of addition and condensation polymers. (Chemistry only) To describe how amino acids react by condensation polymerisation to form polypeptides.	**Tier 3** **Hydrocarbon** **Alkane** **Homologous** **Fractional Distillation** **Evaporation** **Condensation** **Viscosity** **Flammability** **Cracking** **Alkene** **Bromine Water** **Chemistry Only:** **Polymers** **Polymerisation** **Alcohols** **Carboxylic Acids**	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.	This GCSE topic builds upon a foundation provided in Year 8 during the Bonding and Separating topic, which covers the concept of fractional distillation. It also builds upon knowledge pupils have developed during the GCSE curriculum, in the topic of Bonding in Year 10.	This will be set as either a Vocabulary test or as consolidation questions on a weekly basis.

YEAR 11 HALF TERM 3 SCIENCE LEARNING PROGRAMME

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Topic	Learning Objectives	Key Vocabulary	Learning Sequence	Linked Learning	Home Learning
Magnetism and electromagnetism.	To describe the difference between permanent and induced magnets To describe the attraction and repulsion between unlike and like poles for permanent magnets To describe, draw and explain the concepts of magnetic fields. To explain how the strength of an electromagnet can be increased. To explain the motor effect using Flemming's left-hand rule. (HT) To be able to calculate force, magnetic flux density, current and length. (HT) Explain the principles of an electric motor (HT) Physics only: To explain how loudspeakers and headphones use the motor effect To understand and explain the generator effect and its uses. To explain the principles of a transformers and carry out appropriate calculations.	**Tier 2** **Poles** **Attract** **Repel** **Motor** **Tier 3** **Magnet** **Permanent magnet** **Induced magnet** **Magnetic field** **Electromagnetism** **Solenoid** **Magnetic flux density** **Generator** **Alternator, Dynamo** **A.C.** **D.C.** **Step up transformer** **Step down transformer**	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 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.	This topic builds upon principles introduced in the Year 7 topic of Magnetism. And the year 8 topic on Electricity. It also builds upon knowledge pupils have developed during the GCSE curriculum in the topics Electricity and Forces covered in year 10.	This will be set as either a Vocabulary test or as consolidation questions on a weekly basis.

YEAR 11 HALF TERM 4 SCIENCE LEARNING PROGRAMME

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Topic	Learning Objectives	Key Vocabulary	Learning Sequence	Linked Learning	Home Learning
Revision	To improve upon areas of weakness	Vocabulary will vary dependent upon identified by class teacher	Improve upon areas of weakness identified for the class.	Linked learning will vary dependent upon identified by class teacher	Homework will be tailored towards the weaknesses of the students in the class to further aid progress.

YEAR 11 HALF TERM 5 SCIENCE LEARNING PROGRAMME

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Topic	Learning Objectives	Key Vocabulary	Learning Sequence	Linked Learning	Home Learning
Revision	To improve upon areas of weakness	Vocabulary will vary dependent upon identified by class teacher	Improve upon areas of weakness identified for the class.	Linked learning will vary dependent upon identified by class teacher	Homework will be tailored towards the weaknesses of the students in the class to further aid progress.