Science

Year 10

What are the aims and intentions of this curriculum?

The aim of our Key Stage 4 Curriculum is to provide the foundations for understanding the material world. Scientific understanding is changing our lives and is vital to the world's future prosperity, and all students should be taught essential aspects of the knowledge, methods, processes and uses of science. They should be helped to appreciate how the complex and diverse phenomena of the natural world can be described in terms of a small number of key ideas relating to the sciences which are both inter-linked, and are of universal application.

Term	Topics	Knowledge and key terms	Skills developed	Assessment
Autumn 1	**Chemistry** • Chemical changes • Electrolysis • Energy changes	Students will learn about: • The reactivity series, displacement reactions, extracting metals, making salts from insoluble bases, neutralization and pH scale, strong and weak acids • Changes at the electrodes during electrolysis, extraction of aluminum, electrolysis of aqueous solutions • Exothermic and endothermic reactions, using energy transfers from reactions, reaction profile diagrams and calculate bond energy	Students are able to: • Observe chemical reactions of Li, Na and K with water (demonstration). • Investigate reaction of some metals with acid (experiment). • Investigate displacement reactions (experiment). • Make salts from metal oxide and acid (required experiment). • Make salts from metal carbonate and acid (required experiment). • Investigate pH of household chemicals-experiment (experiment). • Write a balanced symbol equation including state symbols for the overall electrolysis of a molten ionic compound, describe electrolysis of solutions in terms of movement of ions. • Safely electrolyse a brine solution, with guidance provided, plan and carry out an electrolysis investigation (required experiment). • Investigating temperature changes in some chemical reactions and classifying a reaction as exothermic or endothermic (required experiment).	• Kerboodle end of chapter assessments (Higher and Foundation) • Required Practical to be written up after each investigation

			• Draw energy profile diagrams and calculate bond energy. Possible careers are: Chemical engineer, Electrolysis engineer, Quality control, Data analyst.	
Autumn 2	**Biology** • Respiration **Revision:** • Biology Paper 1 **Physics** • Molecules and matter • Radioactivity	Students will learn about: • Aerobic and anaerobic exercise, metabolism and the liver • Density, states of matter, changes of state, internal energy, specific latent heat, gas pressure and temperature. • Radioactivity and the nuclear model of an atom, alpha beta and gamma radiations, activity and half-life	Students are able to: • Compare the processes of aerobic and anaerobic respiration with regard to the need for oxygen. • Measure their pulse rate after varying levels of activity (experiment) • Write the balanced symbol equation for anaerobic respiration in plants and microorganisms, compare and contrast aerobic and anaerobic respiration. • Explain how your body responds to the increased demands of energy during exercise. • Measure the density of a solid and a liquid (required experiment). • Using the temperature- time graph to find the melting point or the boiling point of a substance. • Measure and calculate specific latent heat. • Explain radioactivity and discovery of nucleus using plum pudding and Rutherford's model. • Calculate activity and half-life. Possible careers are: Radiologist, Material engineer, Physiotherapist, Medical careers, Sports trainer	• Biology Paper 1 • Required Practical to be written up after each investigation
Spring 1	**Biology**	Students will learn about: • Homeostasis and the structureand function of	Students are able to: • Describe that the body consists of a range of different types of cells and	• Kerboodle end of chapter assessments

	• The human nervous system • Hormonal coordination • Reproduction	the nervous system. • About homeostasis, the human endocrine system, hormones in human reproduction, contraception, hormones in infertility treatment and negative feedback. • Sexual and asexual reproduction, meiosis • About the structure of DNA, genes, chromosomes and genome.	systems. • Plan and carry out an investigation into the effect of a factor on human reaction time (required experiment). • Explain how insulin controls blood glucose (sugar) levels in the body. • Explain Type 1 and Type 2 diabetes • Know the positive associations between physical activity and promotion of mental wellbeing, including as an approach to combat stress. • State the characteristics and evidence of what constitutes a healthy lifestyle, maintaining a healthy weight, including the links between inactive lifestyle and ill health, including Type 2 diabetes. • Know how to maintain healthy eating and the links between a poor diet and health risks. • Explain that the reproductive system includes the parts of the body concerned with reproduction in humans. • Describe the roles of hormones in human reproduction, including the menstrual cycle. • Explain the interactions of FSH, oestrogen, LH and progesterone, in the control of the menstrual cycle. • Evaluate the different hormonal and non-hormonal methods of contraception. • Recall some of the facts about reproductive health, including fertility, and the potential impact of lifestyle on fertility for men and women and menopause. • State the facts about some of the	(Higher and Foundation) • Required Practical to be written up after each investigation

			contraceptive choices, efficacy and options available. • Recall the facts around pregnancy. • Recall how the use of alcohol and drugs can lead to risky sexual behaviour. • Know the key facts about puberty, the changing adolescent body and menstrual wellbeing. • Recall the main changes which take place in males and females, and the implications for emotional and physical health. • Explain the Human Genome Project, meiosis, protein synthesis, sexual and asexual reproduction, sex determination and other genetic inheritance. Possible careers are: • Radiologist, Material engineer, Molecular scientist, Physiotherapist, Medical careers, Sports trainer,Biomedical scientist, Clinical research associate, Clinical scientist, Genomics, Genetic counsellor, Plant breeder/geneticist, Research scientist (life sciences)	
Spring 2	**Chemistry** • Rates and equilibrium • Crude oil and fuels	Students will learn about: • The rate of reactions, reversible reactions, factors affecting a rate of reaction like concentration, temperature, pressure, surface area and dynamic equilibrium. • Carbon compounds as fuels andfeedstock, fractional distillation, hydrocarbons,	Students are able to: • Calculate the mean rate of a reaction from given information about the quantity of a reactant used or the quantity of a product formed and the time take. • Measure the decreasing mass of a reaction mixture (required experiment). • Measure the increasing volume of gas given off in a chemical reaction mixture (required experiment). • Measure the decreasing light passing through a solution (required experiment).	• Kerboodle end of chapter assessments (Higher and Foundation) • Required Practical to be written up after each investigation

		cracking and alkenes.	• Draw, and interpret, graphs showing the quantity of product formed or quantity of reactant used up against time. • Draw tangents to the curves on these graphs and use the slope of the tangent as a measure of the rate of reaction. • Investigate the effect of changing concentration on the rate of reaction (required experiment). • Investigate the effect of changing temperature on the rate of a reaction (experiment). • Calculate the gradient of a tangent to the curve on these graphs as a measure of rate of reaction at a specific time. • Explain the effect of increasing temperature and pressure on the rate of a reaction. • Explain dynamic equilibrium and Le Chatelier's Principle. Possible careers are: Chemical engineer, Material engineer, Molecular scientist, Data analyst	
Summer 1	**Physics** • Forces in balance • Motion • Forces and motion	Students will learn about: • Vectors and scalar quantities, forces and their interactions, the parallelogram and resolution of forces • Speed and distance-time graph, velocity time-graphs, analysing motion graphs • Force and acceleration, weight and terminal velocity, momentum, forces and elasticity	Students are able to: • Interpret a scale diagram to determine the magnitude and direction of a vector. • Use a scale diagram to add two or more vectors. • Draw a scale free-body force diagram showing different types of forces acting on it. • Investigate equal and opposite forces – tug of war (experiment) • Find the resultant of two forces at an obtuse angle by drawing a scale diagram. • Find the Centre of mass of an irregular-shaped card (experiment). • Calculate the distance travelled from a velocity-time graph. • Use force and extension data to	• Kerboodle end of chapter assessments (Higher and Foundation) • Required Practical to be written up after each investigation

			compare the behavior of different materials in deformation using the idea of proportionality. • Demonstrate that a force can cause an object to speed up, slow up, slow down or change the direction of moving object. • Investigate force and acceleration (required experiment) Possible careers are: Astrophysicist, Car mechanic, Mechanical engineer, Police, Traffic signalers.	
Summer 2	**Revision:** • Chemistry Paper 1 • Physics Paper 1 **Biology** • Variation and evolution • Genetics and evolution	Students will learn about: • Atoms, bonding and mole • Chemical reactions and energy changes • Energy and energy resources • Particles at work Students will learn about: • Variation, evolution by natural selection, selective breeding, genetic engineering and ethics of genetic technologies. • Evidence of evolution, fossils and extinction, antibiotic resistant bacteria. • Traditional binomial classification and modern methods of classification.	Students will develop various exam skills by practicing past exam questions. Students are able to: • Describe how a lack of biodiversity can affect an ecosystem. • Describe how preserving biodiversity can provide useful products and services for humans. • Describe the problems with classification. • Explain abiotic and biotic factors that affect communities. Possible careers are: Geneticist, Data scientist, Counsellor, Medical careers, Midwife, Obstetrician, Pediatrics doctor, Ecologist, Environmental field technician, Wildlife	End of Year exams: • Chemistry Paper 1 • Physics Paper 1

			specialist, Sustainability consultant, Wildlife biologist, Environmental planner	