

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	The reactivity series, displacement reactions, extracting metals, making salts, changes at the electrodes, extraction of aluminum, electrolysis of aqueous solutions, endothermic and exothermic reactions, reaction profiles, bond energy calculations.	Investigate displacement reactions, making salts from metal oxide and acid, write the balanced symbol equation for anaerobic respiration in plants and microorganisms, compare and contrast aerobic and anaerobic respiration, 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, can safely electrolyse a solution, with guidance provided, plan and carry out an electrolysis investigation, explain, using observations from calorimetry, how to classify a reaction as exothermic or endothermic, label activation energy on a reaction profile diagram, generate a specific reaction profile diagram for a given chemical reaction when its energy change is also supplied, identify bonds broken in reactants and new bonds made in products of a reaction.	<ul style="list-style-type: none"> Kerboodle end of chapter assessments (Higher and Foundation) Required Practical to be written up after each investigation
	Biology The human nervous system	Principles of homeostasis, the structure and function of the human nervous system, reflex actions.	Identify stimuli, receptors, coordination centre and effectors in examples of nervous and chemical responses, describe the pathway of impulses from receptor to effector, describe the events involved in a reflex action.	
Autumn 2	Biology Hormonal coordination Reproduction Variation and evolution	Principles of hormonal control, the control of blood glucose levels, treating diabetes, the role of negative feedback, human reproduction, hormones and the menstrual cycle, artificial control of fertility, types of reproduction, cell division in sexual reproduction,	Describe the role of hormones released by endocrine glands, describe the difference in the causes of Type 1 and Type 2 diabetes, interpret and explain diagrams of negative feedback control, name the glands that produce the hormones oestrogen, progesterone, LH and FSH, describe the steps used in IVF, can compare asexual and asexual reproduction, explain the importance of meiosis, fertilization and variation in sexual reproduction, use genetic terms and set out a genetic cross with the use of a Punnett square, explain the inheritance of genetic disorders as applied to polydactyly and cystic fibrosis, explain screening of genetic	<ul style="list-style-type: none"> Kerboodle end of chapter assessments (Higher and Foundation) Required Practical to be written up after each investigation

		DNA and the genome, inheritance in action, more about genetics and inherited diseases, variation, evolution by natural selection, selective breeding, genetic engineering, ethics of genetic technologies, infertility treatments.	disorders and the implications of using this technology. Can explain the causes of variation in terms of genetic, environmental, or a combination of both, understand the role of mutation in variation, understand the theory of evolution by survival of the fittest and natural selection, can explain selective breeding and its pros and cons.	
Spring 1	Physics Forces in balance Motion Force and motion Wave properties	Force and acceleration, weight and terminal velocity, forces and braking, momentum, forces and elasticity, transverse and longitudinal waves, measuring the wave speed, reflection and refraction.	Can determine experimentally the relationships between a force acting on an object and the acceleration, compare the concepts of mass and weight, investigate the concept of momentum and its conservation, investigating waves.	<ul style="list-style-type: none"> • Kerboodle end of chapter assessments (Higher and Foundation) • Required Practical to be written up after each investigation
Spring 2	Biology Genetics and evolution Adaptations and interdependence and competition Organizing an ecosystem Biodiversity and ecosystems	Variation, evolution by natural selection, selective breeding, genetic engineering, evidence for evolution, fossils and extinction, adaptations in plants and animals, competition in plants and animals, feeding relationships, materials cycling, the carbon cycle, land, water and air pollution, global warming.	Students should understand the importance of communities including the interdependence of all the species present, explain the effects of biotic and abiotic factors on populations, measure the distribution of organisms with quadrats and transects, describe and explain how organisms are adapted to survive in many different conditions, explain in detail food chains/food webs as models to show feeding relationships, explain the decay cycle, water cycle, carbon cycle and their importance	<ul style="list-style-type: none"> • Kerboodle end of chapter assessments (Higher and Foundation) • Required Practical to be written up after each investigation
Summer 1	Chemistry Rates and equilibrium Crude oil and fuels Chemical analysis	Rate of reaction, collision theory and surface area, energy and reversible reactions, hydrocarbons, fractional distillation of crude oil, burning hydrocarbon fuels, cracking hydrocarbons, pure substances and mixtures, analysing chromatograms, testing for gases.	Can calculate the rate of reaction at a specific time, use collision theory to explain how changing temperature alters the rate of reaction, safely complete an experiment on how temperature affects the rate of a reaction, describe a familiar reversible reaction using a balanced symbol equation, can describe crude oil and alkanes by using their chemical formula or displayed formula, explain the separation of crude oil by fractional distillation and use of those fractions, explain how the volatility, viscosity and flammability of hydrocarbons are affected by the size of their molecules, write word and balanced chemical equations for complete and incomplete combustion of hydrocarbons, explain cracking process and its uses.	<ul style="list-style-type: none"> • Kerboodle end of chapter assessments (Higher and Foundation) • Required Practical to be written up after each investigation

Summer 2

Chemistry

The Earth's atmosphere

The Earth's resources

History of our atmosphere, our evolving atmosphere, greenhouse gases, global climate change, atmospheric changes, history of our atmosphere, our evolving atmosphere, greenhouse gases, global climate change, atmospheric pollutants, history of our atmosphere, our evolving atmosphere, greenhouse gases, global climate change, atmospheric pollutants.

Understand the origin of early atmosphere and how it has evolved over time, explain how the atmosphere is currently affected by human activity causing global warming, can explain the effect of other pollutants on the Earth, including carbon monoxide, Sulphur dioxide, nitrogen oxides and particulates, understanding of finite and renewable resources should be applied to the need of reuse and recycle, and they should be able to describe and evaluate ways of reducing the use of finite resources, and carry out life cycle assessments on products.

- Kerboodle end of chapter assessments (Higher and Foundation)
- Required Practical to be written up after each investigation

Physics

Electromagnetic waves

Electromagnetism

The electromagnetic spectrum-light, infrared, microwaves and radio waves, UV waves, X-rays, gamma rays, X-rays in medicine, magnetic fields, magnetic field of electric currents, the motor effect.

Students can explain the electromagnetic spectrum, some of their uses and dangers, examine the magnetic field produced by a current and investigate the factors that affect the direction and strength of this field, describe how a current carrying wire placed in a magnetic field would experience the motor effect.