Birches Head Academy

Science

Part of the Frank Field Education Trust

KS4 Curriculum Plan

Year 10

	LP1	LP2	LP3	LP4	LP5
TOPIC	***Cell Biology, Transport Processes, and Human Physiology***	***Atomic Structure, Bonding, and Chemical Calculations***	***Energy, Reactivity, and Chemical Change***	***Health, Disease, and Electrical Circuits***	***States of Matter, Radiation, Forces, and Motion***
Knowledge	Students will learn how microscopy has evolved from simple light microscopes to advanced electron microscopes for detailed cell study. They will draw and label plant and animal cells, compare eukaryotic and prokaryotic cells, and explore their specialized adaptations. The topics include diffusion, osmosis, and active transport, with practical experiments to enhance skills. Students will study the cell cycle, growth, differentiation, and stem cells, including ethical issues. They will investigate the human digestive system, food tests, catalysts, and enzymes. Finally, students will examine blood composition, the heart, blood vessels, breathing, and respiration to understand body functions.	Students will explore atomic structure, ions, isotopes, and the development of the periodic table. They will learn to balance chemical equations and separate mixtures using techniques like fractional distillation and chromatography, including Rf value calculations. The properties and reactivity of Group 1 and Group 7 elements will be studied. Students will examine ionic, covalent, and metallic bonding, including giant structures, polymers, fullerenes, and graphene. Key concepts such as states of matter, relative mass, moles, and concentration calculations will be introduced. Understanding is reinforced through literacy tasks, assessments, and PRT activities to build confidence in chemical knowledge and practical skills	Students will explore energy stores, transfers, and the conservation of energy, including calculations for work done, kinetic, gravitational potential, and elastic potential energy. They will study efficiency, power, and the use of electrical appliances, as well as methods of conduction and insulation. Practical work includes specific heat capacity and salt preparation. Students will investigate energy demands, renewable and non-renewable resources, and environmental impacts. In chemistry, they will learn about the reactivity series, displacement, metal extraction, and electrolysis. They will explore acids, alkalis, neutralisation, and energy changes in reactions, supported by literacy tasks, practicals, assessments, and PRT activities to strengthen understanding.	Students will explore health and disease, learning how pathogens spread and how to prevent illness through vaccinations, antibiotics, and drug development. They will study viral, bacterial, fungal, and protist diseases, as well as the human immune response. Non-communicable diseases, including cancer, and the effects of lifestyle factors such as smoking, diet, and alcohol will be examined. In physics, students will investigate current, potential difference, resistance, and circuit components through required practicals. They will explore alternating current, electrical power, energy transfer, and appliance efficiency. The module includes literacy tasks, assessments, and PRT activities to support understanding of key scientific concepts	Students will learn about states of matter, changes of state, and specific latent heat, interpreting temperature-time graphs. They will study gas pressure, atomic structure, and radiation types including alpha, beta, and gamma. Concepts of activity and half-life will be introduced. In forces, students will explore vectors, scalars, resultant forces, and center of mass, with higher-level topics like the parallelogram and resolution of forces. Motion topics include speed, velocity, acceleration, and motion graphs. Literacy tasks, assessments, and practical investigations support their understanding of key physics concepts and data interpretation skills.
Skills					
Key Vocab	Microscopy, Eukaryotic cells, Prokaryotic cells, Diffusion, Osmosis, Active transport, Cell cycle, Differentiation, Stem cells, Enzymes, Catalysts, Digestive system, Blood circulation, Respiration, Adaptations	Atoms, Ions, Isotopes, Periodic Table, Electron Structure, Chemical Equations, Mixture Separation, Chromatography, Rf Values, Group 1, Group 7, Ionic Bonding, Covalent Bonding, Metallic Bonding, Polymers, Fullerenes, Giant Structures, Relative Mass, Moles, Concentration	Energy stores, Work done, Efficiency, Power, Conduction, SHC, Reactivity series, Displacement, Electrolysis, Neutralisation, pH, Exothermic, Endothermic, Bond energy, Metal extraction	Health, Disease, Pathogens, Vaccinations, Antibiotics, Drug Development, Non-communicable Diseases, Cancer, Smoking, Diet, Alcohol, Current, Potential Difference, Resistance, Electrical Circuits	States of matter, Temperature-time graph, Specific latent heat, Gas pressure, Atomic structure, Radiation, Half-life, Vectors, Scalars, Resultant forces, Centre of mass, Parallelogram of forces, Resolution of forces, Velocity, Acceleration

Year 11

	LP1	LP2	LP3	LP4	LP5
TOPIC	***Energy, Electricity, and Environmental Impact***	***Forces, Motion, Magnetism and Evolution***	***Adaptation, the Periodic Table, and Chemical Reactions***	***Electrolysis, Energy Changes, and Chemical Reactions***	
Knowledge	Students will explore energy stores and the conservation of energy, learning how energy is transferred through work. They will study gravitational potential and kinetic energy stores, energy dissipation, and efficiency. Topics include electrical appliances, power, conduction, and insulation, with practical literacy tasks to enhance understanding. Students will investigate specific heat capacity, heating, insulation of buildings, and global energy demands. Renewable energy sources and environmental impacts are covered alongside big energy issues. Electrical concepts such as current, charge, potential difference, resistance, and component characteristics will be examined. They will learn about series and parallel circuits, alternating current, cables, plugs, and electrical power transfer with practical assessments and efficiency studies	Students will study forces and motion, beginning with vectors and scalars, and how forces interact between objects. They will calculate resultant forces, understand centre of mass, and use parallelograms of forces. Speed, velocity, and acceleration will be explored through distance-time and velocity-time graphs. Students will investigate Newton's laws, weight, terminal velocity, momentum, and braking forces. In magnetism, they'll learn about magnetic fields, electromagnets, and the motor effect. Biology lessons cover evolution, fossil evidence, extinction, antibiotic resistance, and classification. Practical skills, graph interpretation, and literacy tasks support learning, along with regular reviews and assessment preparation.	Students will begin by exploring how animals and plants adapt to survive in different environments. In chemistry, they will study the development of the periodic table, electronic structure, and properties of Group 1 and Group 7 elements. Lessons continue with bonding—including ionic, covalent, and metallic structures—and key materials like graphene and fullerenes. Students will develop calculation skills through work on relative mass, moles, and concentrations. They will investigate the reactivity series, metal extraction, and acid reactions, including neutralisation and the pH scale. Practical activities and literacy tasks will support learning and help students prepare for assessments.	Students will study electrolysis, including how substances change at the electrodes, the extraction of aluminium, and the electrolysis of aqueous solutions. They will explore exothermic and endothermic reactions, energy transfers, energy profiles, and bond energy calculations. The unit covers rates of reaction and collision theory, examining factors like temperature, concentration, and catalysts. Students will also learn about reversible reactions, dynamic equilibrium, and how changing conditions affect it. In chemistry, hydrocarbons are studied through fractional distillation, burning, and cracking. Regular revision and literacy tasks support understanding and exam preparation.	
Skills	Scientific enquiry: Students will further develop enquiry skills from Ks3, they will develop a greater confidence in using more complex scientific equipment in order to explain scientific phenomena in greater depth. Evaluating skills, Students will develop greater evaluating skills in order to competently evaluate results from				
Key Vocab	Energy stores, Conservation of energy, Work, Gravitational potential energy, Kinetic energy, Energy efficiency, Energy dissipation, Electrical power, Conduction, Insulation, Specific heat capacity, Renewable resources, Current, Resistance, Series and parallel circuits	Forces, vectors, scalars, acceleration, speed, velocity, momentum, braking, magnetism, electromagnet, motor effect, evolution, fossils, classification, resistance	Adaptation, survival, periodic table, alkali metals, halogens, bonding, ions, covalent, graphene, moles, equations, reactivity, salts, pH, acids	Electrolysis, electrodes, aluminium extraction, aqueous solutions, exothermic, endothermic, energy profiles, bond energy, collision theory, catalysts, reversible reactions, dynamic equilibrium, hydrocarbons, fractional distillation, cracking	