Birches Head Academy

Science

Part of the Frank Field Education Trust

KS3 Curriculum Plan

Year 7

	LP1	LP2	LP3	LP4	LP5
TOPIC	***Lab Skills,Cells and Elements***	***Particles and the Breathing System***	***Seperating Mixtures and Forces***	***Reproduction and The Earth***	***The Universe and Interdependence***
Knowledge	Students will learn lab expectations, safety procedures, and how to use essential equipment, including earning a Bunsen burner license. They will study microscopes and cell observation, focusing on animal and plant cells and drawing techniques. Literacy tasks support understanding of specialized cells and movement of substances, with analysis and graph improvement skills. Topics include unicellular organisms, atomic structure, elements, compounds, and chemical formulae. Students will explore polymers through hands-on Molymod lessons, followed by assessments and reflection on their learning to improve understanding and practical skills in biology and chemistry.	Students will explore the particle model of matter, learning how particles behave in solids, liquids, and gases. They will study changes of state, the effect of temperature on particle movement, and how gas pressure is caused by particle collisions. Lessons include interpreting particle diagrams and linking particle theory to real-life examples like diffusion and air pressure. In the breathing and lifestyle unit, students will examine the structure of the gas exchange system and how breathing works. They will learn about gas exchange in the alveoli, the effects of smoking and exercise, and how the breathing and circulatory systems work together to transport oxygen.	In separating mixtures, students learn that mixtures can be separated using physical methods such as filtration, evaporation, distillation, and chromatography. The topic explores how different properties like solubility, boiling point, and particle size are used to separate substances, and highlights real-life applications such as water purification. The forces topic introduces different types of forces, including contact and non-contact forces like gravity, friction, and air resistance. Students learn how forces affect motion, how to measure them using a Newton meter, and how balanced and unbalanced forces influence movement.Together, these topics develop students' understanding of physical processes and how they apply in everyday contexts.	The Reproduction and Earth topics from explore key biological and geological processes. In the Reproduction topic, students learn about human and plant reproduction, including the structure and function of reproductive organs, fertilisation, and the development of a baby during pregnancy. It also covers puberty and changes in the human body, helping students understand how organisms grow and reproduce. The Earth topic focuses on the structure of the Earth and the rock cycle, explaining how sedimentary, igneous, and metamorphic rocks are formed. It also explores the composition of the atmosphere, the carbon cycle, and the impact of human activity on climate change. These topics help students understand both life processes and the dynamic nature of our planet.	The Universe and Interdependence topics introduce students to key concepts in physics and biology. The Universe topic explores the structure and scale of the solar system, including the relative sizes and distances of planets, the movement of celestial bodies, and the causes of day, night, and seasons. It also introduces the concept of gravity and how it governs the motion of objects in space. The Interdependence topic focuses on how organisms in ecosystems rely on each other and their environment to survive. It covers food chains and food webs, competition, and the importance of biodiversity and stable ecosystems. Students learn how changes in environmental conditions can affect populations and how human activity can disrupt natural balances. Together, these topics help students understand both the vastness of space and the delicate connections within life on Earth.
Procedural Knowledge	Scientific Enquiry: Students will to further develop scientific enquiry skills as they move into KS3. Students will use a wider range of scientific equipment to explain scientific phenomena. Evaluating Skills: Students will be able to call upon a range of resources to evaluate experiments. Including observations, tabulated data and graphical data to form logical conclusion and evaluations. Communicating about science:				
Key Vocab	Cell, Nucleus, Cytoplasm, Cell membrane, Mitochondria, Ribosome Chloroplast, Vacuole, Cell wall, Microscope Magnification, Tissue, Organ, Organ system, Specialised cell, Diffusion, Multicellular, Unicellular, Element, Atom, Compound, Periodic Table, Symbol, Chemical formula, Metal, Non-metal, Group, Period, Physical property Chemical property, Reactivity, Conductor, Insulator, Mixture, Pure substance, Chemical reaction	Particles, states of matter, temperature, diffusion, gas pressure, evaporation, condensation, particle diagrams, alveoli, gas exchange, lungs, diaphragm, breathing, circulation, oxygen	Mixture, Pure substance, Solution, Solute, Solvent, Solubility, Dissolve, Filtration, Evaporation, Distillation, Chromatography, Residue, Filtrate, Condensation, Boiling point, Melting point, Solubility, Saturated solution, Insoluble, Separation technique, Force, Newton (N), Newton Meter, Interaction Pair, Contact force, Non-contact force, Gravity, Friction, Air resistance, Water resistance, Upthrust, Balanced force, Unbalanced force, Resultant force, Mass, Weight, Newton meter, Hooke's Law, Elastic limit, Extension, Force diagram, Deformation,	Reproduction, Sexual reproduction, Asexual reproduction, Fertilisation, Egg (ovum), Sperm, Zygote, Embryo, Foetus, Uterus, Ovary, Testes, Penis, Vagina, Menstrual cycle, Puberty, Placenta, Umbilical cord, Pollination, Fertilisation (plants), Seed dispersal, Germination, Rock, Igneous rock, Sedimentary rock, Metamorphic rock, Rock cycle, Erosion, Weathering, Fossil, Crystallisation, Sediment, Compaction, Cementation, Mineral, Earth's structure, Crust, Mantle, Core, Tectonic plate, Atmosphere, Carbon dioxide, Greenhouse gas, Climate change, Recycling, Finite resource, Renewable resource	Universe, Galaxy, Milky Way, Star, Planet, Moon, Solar System, Orbit, Gravity, Rotation, Axis, Day, Night, Year, Light year, Satellite, Telescope, Heliocentric model, Geocentric model, Seasons, Phases of the Moon, Ecosystem, Habitat, Population, Community, Species, Producer, Consumer, Herbivore, Carnivore, Omnivore, Predator, Prey, Food chain, Food web, Interdependence, Competition, Biodiversity, Adaptation, Environment, Resources, Pollution, Conservation

Year 8

	LP1	LP2	LP3	LP4	LP5
TOPIC	***The Earth and The Universe***	***Digestion and The Periodic Table***	***Energy cost, transfer and Respieration***	***Metals/non-metals and Circuits***	***Inheritance and Chemical Reactions***
Knowledge	The Earth topic focuses on the structure of the Earth and the rock cycle, explaining how sedimentary, igneous, and metamorphic rocks are formed. It also explores the composition of the atmosphere, the carbon cycle, and the impact of human activity on climate change. These topics help students understand both life processes and the dynamic nature of our planet.The Universe and Interdependence topics introduce students to key concepts in physics and biology. The Universe topic explores the structure and scale of the solar system, including the relative sizes and distances of planets, the movement of celestial bodies, and the causes of day, night, and seasons. It also introduces the concept of gravity and how it governs the motion of objects in space.	The Digestion and Periodic Table topics from the cover important ideas in biology and chemistry. The Digestion topic explores how the human digestive system breaks down food to provide nutrients and energy. Students learn about the roles of different organs, the function of enzymes, and how nutrients are absorbed into the bloodstream. It emphasises the importance of a balanced diet and the consequences of poor nutrition. The Periodic Table topic introduces students to the structure and use of the periodic table, explaining how elements are arranged by atomic number and grouped based on similar properties. It covers the differences between metals and non-metals, and introduces patterns in reactivity, particularly in groups such as the alkali metals and noble gases. These topics build a foundation for understanding how the body processes food and how elements are organized and behave in chemical reactions.	The Energy Cost and Transfer and Respiration has a focus on how energy is used and released in physical and biological systems. In the Energy Cost and Transfer topic, students learn how energy is transferred through different systems, how to calculate energy costs, and how to reduce energy waste through insulation and efficiency. It also covers different energy resources, including renewable and non-renewable sources, and their environmental impacts. The Respiration topic explains how cells release energy from glucose through the process of aerobic respiration, using oxygen to produce energy, carbon dioxide, and water. It also introduces anaerobic respiration and compares the two processes in terms of efficiency and by-products. Together, these topics help students understand how energy powers both machines and living organisms, and why managing energy use is important for sustainability and health.	The Metals and Non-Metals and Circuits topics introduce fundamental concepts in chemistry and physics. In the Metals and Non-Metals topic, students learn to compare the physical and chemical properties of metals and non-metals, including their appearance, conductivity, malleability, and reactivity. The topic also explores how metals react with oxygen, acids, and water, and introduces the idea of displacement reactions and the reactivity series. The Circuits topic focuses on how electrical circuits work, covering key components such as cells, bulbs, switches, and resistors. Students learn how to draw circuit diagrams, understand current and potential difference, and explore how series and parallel circuits behave. These topics build a foundation for understanding materials and their uses, as well as the principles of electricity and how it powers everyday devices.	The Inheritance and Chemical Reactions topics introduce important ideas in biology and chemistry. In the Inheritance topic, students learn how genetic information is passed from parents to offspring, exploring inherited characteristics, variation, and the role of DNA and genes. It also covers selective breeding and the importance of genetic diversity in populations. The Chemical Reactions topic focuses on how substances react to form new materials, teaching students to identify signs of a chemical reaction, such as gas production, temperature change, and colour change. It includes key reaction types such as combustion, oxidation, thermal decomposition, and neutralisation, and introduces the concept of conservation of mass. Together, these topics help students understand how traits are passed down through generations and how matter changes through chemical processes.
Procedural Knowledge	Scientific Enquiry: Students will have a good foundation from year 7 to further develop scientific enquiry skills. Students will use a wider range of scientific equipment to explain scientific phenomena. Evaluating Skills: Students will be able to call upon a range of resources to evaluate experiments. Including observations, tabulated data and graphical data to form logical conclusion and evaluations. Communicating about science: Students will be able to confidently explain scientific concepts through practical work and written tasks. Students will be able to independently use scientific command words when answering questions on the topics studied.				
Key Vocab	Rock, Igneous rock, Sedimentary rock, Metamorphic rock, Rock cycle, Erosion, Weathering, Fossil, Crystallisation, Sediment, Compaction, Cementation, Mineral, Earth's structure, Crust, Mantle, Core, Tectonic plate, Atmosphere, Carbon dioxide, Greenhouse gas, Climate change, Recycling, Finite resource, Renewable resource, Universe, Galaxy, Milky Way, Star, Planet, Moon, Solar System, Orbit, Gravity, Rotation, Axis, Day, Night, Year, Light year, Satellite, Telescope, Heliocentric model, Geocentric model,	Digestion, Enzyme, Amylase, Protease, Lipase, Mechanical digestion, Chemical digestion, Small intestine, Stomach, Mouth, Oesophagus, Absorption, Bile, Villi, Nutrients, Carbohydrates, Proteins, Fats (Lipids), Element, Atom, Periodic table, Group, Period, Metal, Non-metal, Transition metals, Alkali metals, Noble gases, Reactivity, Atomic number, Symbol, Mass number	Energy, Energy transfer, Energy efficiency, Energy store, Work done, Power, Joules (J), Watt (W), Renewable energy, Non-renewable energy, Thermal energy, Conduction, Convection, Radiation, Insulation, Fossil fuels, Respiration, Aerobic respiration, Anaerobic respiration, Glucose, Oxygen Debt, Energy, Mitochondria, Carbon dioxide, Lactic acid, Breathing, Gas exchange, Diffusion, Fermentation, Biotechnology.	Metal, Non-metal, Conductor, Insulator, Malleable, Ductile, Sonorous, Lustrous, Brittle, Reactivity, Corrosion, Oxidation, Displacement reaction, Reactivity series, Ore, Circuit, Current, Voltage (potential difference), Resistance, Conductor, Insulator, Ammeter, Voltmeter, Series circuit, Parallel circuit, Battery, Cell, Component, Switch, Ohm (Ω)	Gene, Chromosome, DNA, Allele, Dominant, Recessive, Genotype, Phenotype, Inheritance, Variation, Inherited characteristics, Environmental characteristics, Selective breeding, Genetic disorder, Mutation, Chemical reaction, Reactant, Product, Exothermic, Endothermic, Combustion, Thermal decomposition, Displacement reaction, Neutralisation, Acid, Alkali, Salt, Precipitate, Conservation of mass, Word equation

Year 9

	LP1	LP2	LP3	LP4	LP5
TOPIC	***Electricity and Magnetism***	***Atomic Structure, Periodic Table and Energy***	***Forces and Pressure***	***Cells, Cell Processes, Chemical energy***	***Genetics, Evolution and Natural Selection***
Knowledge	Students will learn how to identify hazards in the lab using symbols, assess risks, and suggest ways to reduce them. They will recognise scientific equipment, draw circuit diagrams, and build series and parallel circuits. Students will measure current and potential difference, and calculate resistance in components and complete circuits. They will explore static electricity, electrostatic attraction, and electric fields through hands-on investigations. Magnetism will be studied using bar magnets and electromagnets, including how strength varies with coil number. Students will link energy use to diet and activity, calculate work done using force meters, and explore how power, cost, and nuclear fuels relate to energy use.	Students will learn the differences between atoms, elements, mixtures, and compounds, and explore the properties and reactivity of elements in groups 1, 7, and 0 of the Periodic Table. They will observe and describe reactions of elements in these groups and use data to predict element properties. Students will study simple machines, including levers and pulleys, and understand the difference between energy and temperature. They will explore energy transfer through conduction, convection, and thermal radiation, and analyse insulation methods based on these principles. Practical activities will help reinforce these concepts, including assessments to track and review learning progress.	Students will explore the effects of forces, including when the resultant force is zero and how forces deform objects. They will learn to apply Hooke's Law to link extension and force and calculate moments of a force. The concept of pressure in fluids and how liquid pressure changes with depth will be studied. Students will explore the idea of stress and interaction pairs. They will use force diagrams to represent force interactions and calculate speed using time-distance graphs. The effect of gravity on different planets and how gravitational force varies with mass and distance will also be covered.	Students will know how to compare and contrast animal and plant cells. Students will then be able to identify and explain adaptations in specialised animal and plant cells, whilst describing the movement of substances through cells through Active Transport, Osmosis and Diffusion. Students will learn how forces behave and state what forces there are. They will also learn how to investigate exothermic and endothermic reactions using a laboratory method. Finally, students will learn how to Interpret energy level diagrams, explain what they are showing and explain what bond energies are.	Students will explore the causes of variation within species, distinguishing between inherited and environmental variation, as well as continuous and discontinuous variation. They will learn how species are adapted to their environment and how organisms adapt to environmental changes. The concept of natural selection will be explained, alongside how organisms evolve over time and the evidence supporting Darwin's theory. Students will examine factors leading to extinction, the importance of biodiversity, and the role of conservation in preventing extinction. Additionally, they will study inheritance, DNA structure, genes, mutations, and genetic engineering, using tools like Punnett squares to understand genetic processes
Procedural Knowledge	Scientific Enquiry: Students will have a good foundation from year 7 & 8 to further develop scientific enquiry skills. Students will use a wider range of scientific equipment to explain scientific phenomena. Evaluating Skills: Students will be able to call upon a range of resources to evaluate experiments. Including observations, tabulated data and graphical data to form logical conclusion and evaluations. Communicating about science: Students will be able to confidently explain scientific concepts through practical work and written tasks. Students will be able to independently use scientific command words when answering questions on the topics studied.				
Key Vocab	Circuit breaker, solenoid, core, magnetic field, permanent magnet, voltage, ohms, series, parallel, amps, attract, repel, electrostatic force,	Nobel gases, unreactive, halogen, alkali metals, natural polymer, synthetic polymer, hydroxide, nitrate, sulphate, carbonate	Incompressible, upthrust, atmospheric pressure, stress, relative motion, acceleration, resultant force, equilibrium, force, friction, moment, fluids, pressure, stress.	Endothermic change, Exothermic change, energy level diagram, chemical bond, Nucleus, Cell membrane, Cytoplasm, Mitochondria, Vacuole, Chloroplast	Variation, inherited variation, environmental variation, continuous variation, discontinuous variation, adaptation, environmental changes, natural selection, evolution, Darwin