



Biology units are grouped into these key areas of study:

BBL (Building blocks of life)

THB (The human body)

IOL (Interaction of life)

Chemistry units are grouped into these key areas of study:

BOM (Behaviour of matter)

CR (Chemical reactions)

OE (Our Earth)

Physics units are grouped into these key areas of study:

BOE (Behaviour of energy)

OEOO (Objects' effects on other objects)

BE (Beyond Earth)

	Unit	Overview of learning intent
Autumn	Chemical Reactions (CR4): The pH scale	- Define acids and alkalis in terms of neutralisation reactions. - The pH scale for measuring acidity/alkalinity; and indicators. - Reactions of acids with metals to produce a salt plus hydrogen. - Reactions of acids with alkali to produce a salt plus water. - Energy changes on changes of state (qualitative). - Exothermic and endothermic chemical reactions (qualitative).
	The human body (THB9): The digestive system	- Content of a healthy diet; carbohydrates, lipids (fats and oils), proteins, vitamins, minerals, dietary fibre and water, and why each is needed. - Calculations of energy requirements in a healthy daily diet. - The consequences of imbalances in the diet, including obesity, starvation, and deficiency disease. - The tissues and organs of the human digestive system, including adaptations to function and how the digestive system digests food (enzymes as biological catalysts). - The importance of bacteria in the human digestive system.
	Our Earth (OE4): Our atmosphere	- The composition of the atmosphere. - The carbon cycle. - The production of carbon dioxide by human activity and the impact on climate. - Earth as a source of limited resources and the efficacy of recycling.
Spring	Behaviour of energy (BOE10): Principles of energy	- Energy as a quantity that can be calculated. - Internal energy stored in materials. - Using physical processes and mechanisms, rather than energy, to explain the intermediate steps that bring about such changes. - The total energy has the same value before and after a change. - Comparing the starting with the final conditions of a system and describing increases and decreases in amounts of energy associated with movements, temperature, changes in position in a field, in elastic distortions and chemical compositions. - Other processes that involve energy transfer: changing motion, dropping an object, completing an electrical circuit, stretching a spring, metabolism of food, burning fuels. - Changes of energy stores that are unwanted, why these occur and how they can be reduced.

	Behaviour of energy (BOE11): Heating and cooling	• Temperature and how to measure temperature difference. • Comparing energy values of different foods (from labels and testing) kJ. • Energy transfer from hotter to cooler objects by conduction and convection. • Energy transfer and thermal equilibrium.
	Building blocks of life (BBL3): Cellular respiration	• Aerobic and anaerobic respiration in living organisms, including the breakdown of organic molecules to enable all the other chemical processes necessary for life. • A word summary for aerobic respiration. • The process of anaerobic respiration in humans and microorganisms, including fermentation, and a word summary for anaerobic respiration. • The difference between aerobic and anaerobic respiration in terms of reactants, the products formed and the implications for the organism.
	The human body (THB7): The breathing system	• The structure and functions of the gas exchange systems in humans, including adaptations to function. • The role of diffusion in the movement of materials. • The mechanism of breathing to move air in and out of the lungs, using a pressure model to explain the movement of gases. • Using a pressure model to explain the movement of gases, including simple measurements of lung volume.
	Behaviour of energy (BOE12): Energy in the home	• Fuels and energy resources. • Compare the power ratings of appliances in watts (W, kW). • Comparing amounts of energy transferred (J, kJ, kW hour). • Domestic fuel bills, fuel use and costs.
	Building blocks of life (BBL4): Plant cells	• The function of the cell wall, vacuole and chloroplasts. • Cells as the fundamental unit of living organisms, including how to observe, interpret and record cell structure using a light microscope. • The similarities and differences between plant and animal cells. • Reproduction in plants, including flower structure, wind and insect pollination, fertilisation, seed and fruit formation and dispersal, including quantitative investigation of some dispersal mechanisms.
	Objects' effects on other objects (OEOO5): Electrical circuits	• Electric current, measured in amperes, in circuits; series and parallel circuits; currents add where branches meet and current as flow of charge. • Potential difference, measured in volts; battery and bulb ratings; resistance, measured in ohms, as the ratio of potential difference to current. • Differences in resistance between conducting and insulating components (quantitative).
Summer	Behaviour of energy (BOE13): Mechanical waves	• Waves on water as undulations which travel through water with transverse motion; these waves can be reflected and add or cancel (superposition). • Frequencies of sound waves, measured in hertz; echoes, reflection and absorption of sound. • Sound needs a medium to travel; the speed of sound in air, in water, in solids. • Sound produced by vibrations of objects, in loudspeakers, detected by their effects on microphone diaphragm and the eardrum; sound waves are longitudinal. • The auditory range of humans and animals. • Pressure waves transferring energy; use for cleaning and physiotherapy by ultrasound; waves transferring information for conversion to electrical signals by microphone. • Waves for detection and exploration.
	Objects' effects on other objects (OEOO6): Forces and motion	• The representation of a journey on a distance-time graph. • Speed and the quantitative relationship between average speed, distance and time: $\text{speed} = \text{distance} \div \text{time}$. • Relative motion: trains and cars passing each other. • Forces being needed to cause objects to stop or start moving, or to change their speed or direction of motion (qualitative); resultant of multiple forces acting in parallel. • Change depending on direction of force and its size.

	Interaction of life (IOL12): Photosynthesis	• The reactants in, and products of, photosynthesis and a word summary of photosynthesis. • The dependence of almost all life on Earth on the ability of photosynthetic organisms, such as plants and algae, to use sunlight in photosynthesis to build organic molecules that are an essential energy store and to maintain levels of oxygen and carbon dioxide in the atmosphere. • The adaptations of leaves for photosynthesis. • The role of stomata in gas exchange in plants. • Plants making carbohydrates in their leaves by photosynthesis and gaining mineral nutrients and water from their roots.
	Behaviour of matter (BOM9): The periodic table	• The principles underpinning the Mendeleev periodic table. • The periodic table: periods and groups; metals and non-metals. • How patterns in reactions can be predicted with reference to the periodic table. • The properties of metals and non-metals. • The chemical properties of metal and non-metal oxides with respect to acidity.
	Objects' effects on other objects (OE007): Changing forces	• Forces associated with deforming objects; stretching and squashing springs. • Force-extension linear relation; Hooke's Law as a special case. • Moment as the turning effect of a force. • Simple machines give bigger force but at the expense of smaller movement.