



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	Building blocks of life (BBL1): Animal cells	- Cells as the fundamental unit of living organisms; the location and function of the nucleus, cytoplasm, cell membrane and mitochondria. - The hierarchical organisation of multicellular organisms: from cells to tissues to organs to organ systems to organisms. - How to use a light microscope to observe cells; the stage, eyepiece lens, objective lens and focusing wheel. - The structure and functions of the human skeleton: protection, production of blood cells and support. - Joints, tendons and the function of muscles; antagonistic muscle pairs bringing about movement.
	Behaviour of matter (BOM5): The particle model	- Atoms and molecules as very small particles; representing particles as spheres in a model. - The properties of the different states of matter (solid, liquid and gas) in terms of the particle model, including arrangement, motion and compressibility. - Density as how much matter is in a given volume; why gases are less dense than solids and liquids. - The anomaly of ice being less dense than liquid water. - Chemical changes as the rearrangement of atoms to form new products.
	Objects' effects on other objects (OEOO4): Changing shape	- Forces as pushes or pulls, measured in newtons (N), arising from the interaction between two objects. - Contact forces (tension, friction, air resistance, upthrust, thrust, normal reaction) and non-contact forces (magnetic, electrostatic, gravitational). - Using force arrows to show the direction and size of forces. - Forces stretching and compressing materials; elastic materials returning to their original shape. - Balanced forces and equilibrium; unbalanced forces changing motion, direction or shape.

	Behaviour of matter (BOM6): The atom	- Dalton's model of the atom; elements as substances containing only one type of atom. - Molecules and compounds; the differences between atoms, elements, molecules and compounds. - Chemical symbols and formulae for common elements and compounds (e.g. H_2O, CO_2, NaCl, MgO). - Compounds having fixed melting and boiling points. - Conservation of atoms in chemical reactions and representing reactions using word equations.
	Beyond Earth (BE3): Astrophysics	- Our Sun as a star; other stars in our galaxy and other galaxies. - Planets, moons, asteroids and comets within the solar system; inner rocky planets and outer gas planets. - Gravity keeping planets in orbit around the Sun and moons in orbit around planets. - The difference between mass and weight. - Gravity force, weight = mass $\times$ gravitational field strength ($W = mg$); different on other planets and stars.
Spring	Behaviour of matter (BOM7): Changes of state	- Changes of state as physical, reversible changes in which mass is conserved. - Measuring the volume of liquids, solids (Eureka can displacement) and gases. - Dissolving and the conservation of mass when a solution is formed; concentration as dilute or concentrated. - Brownian motion and the constant, random motion of particles. - Diffusion in liquids and gases as the net movement of particles from high to low concentration.
	Building blocks of life (BBL2): Human reproduction	- The structure and function of the male and female reproductive systems. - The menstrual cycle (without details of hormones) and its role in preparing for pregnancy. - Gametes, fertilisation and gestation. - The role of the placenta and umbilical cord in providing nutrients and oxygen and removing waste. - Changes at puberty.
	Chemical reactions (CR3): Types of reactions	- Chemical reactions as the rearrangement of atoms; reactants and products; observations that indicate a reaction. - Combustion of fuels and the test for carbon dioxide using limewater. - Thermal decomposition (e.g. copper carbonate $\rightarrow$ copper oxide + carbon dioxide). - Oxidation as the addition of oxygen (e.g. iron and copper forming oxides). - Displacement reactions, where a more reactive substance replaces a less reactive one in a compound. - Representing chemical reactions using word equations.
	The human body (THB7): The breathing system	- The structure and functions of the gas exchange system in humans, including adaptations to function (cilia, goblet cells, alveoli). - The role of diffusion in the movement of oxygen and carbon dioxide in the alveoli. - The mechanism of breathing to move air in and out of the lungs, using a pressure model to explain the movement of gases. - Simple measurements of lung volume, including vital lung capacity.
Summer	The human body (THB8): Healthy living	- Unicellular organisms; the structure of a bacterium; bacteria, protozoa and fungi as possible pathogens. - Drugs as chemicals that cause changes in the body; medicinal and recreational drugs. - The impact of exercise and asthma on the breathing system. - The effects of smoking on human health, including lung disease, heart disease and some cancers. - The effects of maternal lifestyle (drugs, smoking, alcohol) on the growth of the foetus.
	Our Earth (OE3): The cycles	- The composition of the Earth: core, mantle and crust. - The structure of the Earth's crust as a mixture of minerals. - The rock cycle and the formation of igneous, sedimentary and metamorphic rocks; their properties. - Salt water and fresh water; water as a vital resource and the issue of water poverty.

	Behaviour of matter (BOM8): Purity	• The concept of a pure substance; identifying pure substances using melting and boiling points. • Mixtures, including air, and how they differ from compounds. • Simple techniques for separating mixtures: filtration, evaporation and crystallisation, and distillation. • Obtaining table salt (sodium chloride) from a mixture.
	Beyond Earth (BE4): The space race	• Telescopes and the development of models of the solar system (geocentric and heliocentric). • Natural and artificial satellites; the V2 rocket and Sputnik 1 as milestones of the space race. • Probes and space telescopes (Hubble and James Webb) in exploring space. • The light year as a unit of astronomical distance. • The life cycle of stars: nebula, main sequence star, white dwarf and supernova.