Year 9

Half Term 1	Half Term 2	Half Term 3	Half Term 4	Half Term 5	Half Term 6
Chemical reactions, exothermic/endothermic	Waves, light and sound	Evolution and inheritance, natural selection	Energy	States of matter and Atomic structure	Cell biology
Organising tables. Making predictions based on understanding. Selecting and applying scientific techniques. Health and safety, evaluating risks.	*Organising tables. Recording data, applying calculations, measuring angles, suggesting improvements to techniques. Suggesting reasons for errors. Identifying variables. Repeatability.*	*Understanding that scientific methods and theories develop as earlier explanations are modified to take account of new evidence and ideas, together with the importance of publishing results and peer review*	*Applying calculations, analysing data. Using SI units.*	*Understanding how scientific theories develop over time. Plan and carry out scientific enquiries. Accuracy and precision. Identifying variables. Chemical nomenclature. Calculating atomic number and mass*	*Understanding scientific understanding develops over time. Applying calculations, understanding and using SI units. using standard form. Presenting and recording data. Analysing data, using graphs.*
		February Assessment			End of year assessment
Materials • the order of metals and carbon in the reactivity series • the use of carbon in obtaining metals from metal oxides **Chemical Reactions** • combustion, thermal decomposition, oxidation and displacement reactions **Energetics** • exothermic and endothermic chemical reactions (qualitative). • representing chemical reactions using formulae and using equations **Periodic Table** • the chemical properties of metal and non-metal	**Observed waves** • waves on water as undulations which travel through water with transverse motion; these waves can be reflected, and add or cancel – superposition. **Sound waves** • frequencies of sound waves, measured in hertz (Hz); 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 loud speakers, detected by their effects on microphone diaphragm and the ear drum; sound waves are longitudinal • auditory range of humans and animals.	**Genetics and evolution** **Inheritance, chromosomes, DNA and genes** • heredity as the process by which genetic information is transmitted from one generation to the next • a simple model of chromosomes, genes and DNA in heredity, including the part played by Watson, Crick, Wilkins and Franklin in the development of the DNA model • differences between species • the variation between individuals within a species being continuous or discontinuous, to include measurement and graphical representation of variation • the variation between species and between individuals of the same species means some organisms compete more	**Changes in systems** • energy as a quantity that can be quantified and calculated; 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 the amounts of energy associated with movements, temperatures, changes in positions in a field, in elastic distortions and in chemical compositions • using physical processes and mechanisms, rather than energy, to explain the intermediate steps that bring about such changes. **Calculation of fuel uses and costs in the domestic context** • fuels and energy resources. **Earth and atmosphere**	**The particulate nature of matter** • the properties of the different states of matter (solid, liquid and gas) in terms of the particle model, including gas pressure • changes of state in terms of the particle model. **The periodic Table** • the varying physical and chemical properties of different elements **Atoms, elements and compounds** • a simple (Dalton) atomic model • differences between atoms, elements and compounds • chemical symbols and formulae for elements and compounds • conservation of mass changes of state.	**Cells and organisation** • cells as the fundamental unit of living organisms, including how to observe, interpret and record cell structure using a light microscope • the functions of the cell wall, cell membrane, cytoplasm, nucleus, vacuole, mitochondria and chloroplasts • the similarities and differences between plant and animal cells • the role of diffusion in the movement of materials in and between cells • the structural adaptations of some unicellular organisms • the hierarchical organisation of multicellular organisms: from cells to tissues to organs to systems to organisms. **Matter** • diffusion in liquids and gases driven by differences in concentration

oxides with respect to acidity.	**Energy and waves** • pressure waves transferring energy; use for cleaning and physiotherapy by ultra-sound; waves transferring information for conversion to electrical signals by microphone. **Light waves** • the similarities and differences between light waves and waves in matter • light waves travelling through a vacuum; speed of light • the transmission of light through materials: absorption, diffuse scattering and specular reflection at a surface • use of ray model to explain imaging in mirrors, the pinhole camera, the refraction of light and action of convex lens in focusing (qualitative); the human eye • light transferring energy from source to absorber leading to chemical and electrical effects; photo-sensitive material in the retina and in cameras • colours and the different frequencies of light, white light and prisms (qualitative only); differential colour effects in absorption and diffuse reflection.	successfully, which can drive natural selection • changes in the environment may leave individuals within a species, and some entire species, less well adapted to compete successfully and reproduce, which in turn may lead to extinction • the importance of maintaining biodiversity and the use of gene banks to preserve hereditary material.	• the production of carbon dioxide by human activity and the impact on climate.	**Pure and impure substances** • the concept of a pure substance • mixtures, including dissolving • diffusion in terms of the particle model • simple techniques for separating mixtures: filtration, evaporation, distillation and chromatography • the identification of pure substances.	