



Unit: Principles and Applications	BIOLOGY	CHEMISTRY	PHYSICS
LESSONS	<ol style="list-style-type: none"> 1. Preparing and viewing microscope slides 2. Magnification calculations 3. Cell organelles 4. Specialised cells 5. Structure and function of blood 6. Cardiovascular system 7. Sliding Filament Theory 8. Nervous system 	<ol style="list-style-type: none"> 1. Periodic table and RAM 2. Preparing a standard solution 3. Electronic structure 4. Acid base titrations 5. Bonding 6. Physical and chemical properties 7. Group 1 and 7 reactivity 8. Metal and acid reactions 9. Variable oxidation states of transition metals 	<ol style="list-style-type: none"> 1. Waves 2. Diffraction and superposition 3. Progressive and stationary resonance 4. Using equations 5. Refractive index 6. Total internal reflection 7. Electromagnetic waves 8. Intensity and inverse square law 9. Communication
Knowledge & Skills Development	<ul style="list-style-type: none"> • Understand the ultrastructure and function of organelles in prokaryote cells (bacterial cell), eukaryotic cells (plant and animal cells), eukaryotic cells (plant-cell specific) • Recognise cell organelles from electron micrographs and the use of light microscopes. • Understand the similarities and differences between plant and animal cell structure and function. • Understand how to distinguish between gram-positive and gram-negative bacterial cell walls and why each type reacts differently to some antibiotics. • Calculate magnification and size of cells and organelles from drawings or images. • Understand cell specialisation in terms of structure and function, to include: palisade mesophyll cells in a leaf, sperm and egg cells in reproduction, root hair cells in plants, white blood cells, red blood cells. • Understand the structure and function of epithelial tissue 	<ul style="list-style-type: none"> • Understand the electronic structure of atoms • Understand ionic bonding: electrostatic attraction, effects ionic radius and ionic charge have on the strength of ionic bonding, formation of ions, electronic configuration diagrams of cations and anions. • Understand covalent bonding: strong electrostatic attraction, dot and cross diagrams, the relationship between bond lengths and bond strengths, tetrahedral basis of organic chemistry. • Describe metallic bonding • Understand the following intermolecular forces: van der Waals, dipole-dipole, hydrogen bonding. • Understand the following: balanced equations, relative atomic mass, atomic number and relative molecular mass, moles, molar masses and molarities. • Understand the quantities used in chemical reactions: mass, volume of solution, concentration, reacting quantities, percentage yields. • Understand the periodic table: 	<ul style="list-style-type: none"> • Understand the features common to all waves and use the following terms as applied to waves: periodic time, speed, wavelength, frequency, amplitude, oscillation. • Graphical representation of wave features. • Understand the difference between the two main types of wave: transverse and longitudinal. • Understand concepts of displacement, coherence, path difference, phase difference, superposition as applied to diffraction gratings. • Understand the industrial application of diffraction gratings • Be able to use the wave equation • Understand the concept and applications of stationary waves resonance. • Understand the principles and applications of fibre optics • Be able to use the inverse square law in relation to the intensity of a wave

	<ul style="list-style-type: none"> Understand the structure and function of endothelial tissue, as illustrated by blood vessels in the cardiovascular system, including the risk factors that damage endothelial cells and affect the development of atherosclerosis Understand the structure and function of muscular tissue Understand the structure and function of nervous tissue 	<p>Periods 1, 2, 3 and 4, groups – s block, p block, d block, layout of periodic table in relation to s, p, d notation, electronic arrangement of elements using s, p, d notation.</p> <ul style="list-style-type: none"> Understand the physical properties of elements: first ionisation energy, reasons for trends in ionisation energy across Periods 2–4 and down, groups 1, 2 and 7, electron affinity, atomic radius, ionic radius, electronegativity, type of bonding in the element, trends – melting point and boiling point, physical properties of metals – electrical conductivity, thermal conductivity, malleability, ductility. Understand the chemical properties of elements: products and reactivity of all Period 2 and 3 elements with oxygen, products and reactivity of metals with oxygen, water, dilute hydrochloric acid and dilute sulfuric acid, position of metals in the reactivity series in relation to position in the periodic table, oxidation, reduction, variable oxidation states of transition metal ions, displacement reactions of metals/halogens, uses and applications of substances produced within this learning aim. 	<ul style="list-style-type: none"> Understand how the regions of the electromagnetic spectrum are grouped according to the frequency Understand how the applications of electromagnetic waves in communications are related to frequency
Assessment / Feedback Opportunities	Formative Assessment Teacher questioning Quizzes Exam style questions		Summative assessment Half Termly Assessments Mock Exams
Key Vocabulary	Independent Variable, Dependent Variable, Control Variables, Method, Conclusion, Precaution, Evaluation, Reliable, Precision, Valid, Anomaly, Describe, Explain, Compare, Analyse, Calculate, Suggest, Absolute, Uncertainty, Error		
Literacy/Reading Opportunities	Subject specific vocabulary introduced before reading of related texts Word etymology from Latin and Greek roots Reading of simple and complex sentences, paragraphs, articles		

	Scientific writing including structuring methods, comparisons and evaluations
Cross Curricular Themes	Numeracy/Maths – averages (means), reading scales, graph plotting, lines of best fit, using and rearranging equations, using scientific calculators
Personal Development (Including British Values, RSE, Citizenship)	None
Career Opportunities	Chemist, Pharmacist, Chemical Engineer, Materials Scientist, Lab Technician, Forensics, anthropology, archaeology, biological scientists, microbiology, biochemistry, Particle physicist, Nuclear technicians, Medical physicist, Radiographer