KS4 Science Curriculum Map

Autumn 1 September - October	Autumn 2 October - Devember	Spring 1 January - February	Spring 2 February - April	Summer 1 April - May	Summer 2 Jun – July
SUMMATIVE ASSESSMENTS					
Marks for the externally-set tests are combined to give a maximum total mark of 150. The student's total mark out of 150 then establishes the level they have achieved.. The student's total mark out of 150 then establishes the level they have achieved as shown in the table below. Fail – Below 30, Entry Level 1 30/150, Entry Level 2 65/150, Entry Level 3 100/150. The assessment for each paper is a test out of 25 marks.					
Paper 3: Chemistry 1A – Atoms, compounds and states of matter	**Paper 1: Biology 1A – Cells, genetics, inheritance and modification**	**Paper 5: Physics 1A – Forces, movement and energy**	**Paper 2: Biology 1B – Health, disease and the development of medicines**	**Paper 4: Chemistry 1B – Separating mixtures, breaking down substances, acids and metals**	**Paper 6: Physics 1B – Waves and radiation**
Chemistry 1A	**Biology A1**	**Physics 1A**	**Biology 1B**	**Chemistry 1B**	**Physics 1B**
Enry Level 1, Entry Level 2, Entry level 3, Level 1 & Level 2					
Knowledge: • Atomic structure and how atoms form elements and compounds • Differences between elements, compounds, and mixtures • Chemical bonding and how it affects properties of substances • States of matter and changes of state using the particle model • Basic reactions, diffusion, and safe practical skills	**Knowledge:** • Structure and function of plant, animal, and bacterial cells • Cell processes such as diffusion, osmosis, mitosis, and meiosis • DNA, genes, and chromosomes and how they control characteristics • Inheritance patterns, including dominant and recessive alleles • Variation, evolution, selective breeding, and genetic modification	**Knowledge:** • Types of forces and their effects on objects • Motion: speed, velocity, acceleration, and distance–time relationships • Newton's laws of motion and how forces cause movement • Different types of energy and energy transfers • Work, power, efficiency, and energy conservation	**Knowledge:** • Different types of diseases: communicable and non-communicable • Pathogens (bacteria, viruses, fungi, protists) and how diseases spread • The human immune system and how the body defends itself • Vaccination, antibiotics, and treatment of disease • Development and testing of medicines, including clinical trials	**Knowledge:** • Separation techniques: filtration, evaporation, crystallisation, distillation, chromatography • Pure substances vs mixtures and how properties differ • Breaking down substances: thermal decomposition, electrolysis, chemical reactions • Acids and metals: reactions, reactivity series, neutralisation, and displacement • Conservation of mass and particle theory in chemical reactions	**Knowledge:** • Waves transfer energy, not matter • Differences between transverse and longitudinal waves • Wave properties: wavelength, frequency, amplitude, and speed • The electromagnetic spectrum and uses of each region • Radiation types (alpha, beta, gamma), half-life, and safety
Skills: • Using laboratory equipment safely and following instructions • Observing and describing changes in substances • Applying the particle model to explain states and changes of matter • Interpreting simple data and results from experiments • Using correct scientific vocabulary to explain ideas	**Skills:** • Using a microscope to observe and compare cells • Interpreting data and diagrams related to cells and genetics • Using Punnett squares to predict inherited traits • Explaining biological processes using correct scientific terms • Working safely and accurately in practical investigations	**Skills:** • Measuring and calculating speed, acceleration, force, and energy • Interpreting graphs and data related to motion and energy • Identifying forces acting on objects using diagrams • Carrying out practical experiments safely and accurately • Explaining real-life applications of forces and energy using scientific language	**Skills:** • Interpreting data and graphs related to disease and health • Evaluating treatments and their effectiveness • Using scientific vocabulary to explain disease processes • Analyzing evidence from medical studies or trials • Understanding risk, ethics, and decision-making in health and medicine	**Skills:** • Performing practical separation techniques safely and accurately • Observing and describing chemical reactions, including with acids and metals • Measuring and recording data during experiments • Interpreting results from practical work and diagrams • Using correct chemical symbols, formulas, and scientific vocabulary	**Skills:** • Calculating wave speed using (v = f\lambda) • Reading and interpreting wave diagrams and graphs • Describing wave behaviours (reflection, refraction, diffraction) • Carrying out practical investigations safely • Evaluating uses and risks of waves and radiation
Resources:					
• Pearsons Edexcel specification • Textbooks: CGP GCSE Chemistry, Kerboodle online resources • Practical kits: Salt dissolving, melting/boiling experiments, simple reactions • Interactive simulations: PhET – States of matter, Bonding simulations • Videos: BBC Bitesize – Atoms, Bonding & Particle theory • Worksheets: Atomic structure labeling, particle diagrams, bonding exercises	• Pearsons Edexcel specification • Textbooks: CGP GCSE Biology, Collins KS4 Biology • Practical kits: Microscopes, slides of plant/animal cells, model DNA kits • Videos/animations: BBC Bitesize – Cells & Genetics, YouTube channels like FuseSchool • Interactive tools: Punnett square simulators, cell structure drag-and-drop games • Worksheets: Diagram labeling, inheritance problems, variation case studies	• Pearsons Edexcel specification • Textbooks: CGP GCSE Physics, Collins KS4 Physics • Practical kits: Force meters, trolleys, ramps, pulleys, energy transfer experiments • Videos/animations: BBC Bitesize – Forces & Motion, YouTube – Physics Practical Demos • Interactive tools: Distance-time graph simulators, energy transfer animations • Worksheets: Calculations (speed, acceleration, energy), graph questions, force diagrams	• Pearsons Edexcel specification • Textbooks: CGP GCSE Biology, Collins KS4 Biology • Case studies: Outbreaks of disease, vaccination campaigns • Videos: BBC Bitesize – Health & Disease, Khan Academy – Immune system • Practical resources: Petri dish simulations, disinfectant experiments • Worksheets: Graph interpretation (disease spread), ethics questions, clinical trial analysis	• Pearsons Edexcel specification • Textbooks: CGP GCSE Chemistry, Collins KS4 Chemistry • Worksheets: Separating mixtures cut-and-stick, filtration & crystallisation, making salts, mixtures practice questions • Lesson packs: Oak National Academy – separating substances lessons with slides, videos, quizzes • Practical resources: Filtration, crystallisation, distillation experiments, electrolysis kits, metal reactivity demonstrations • Videos: BBC Bitesize – Separation techniques, reactions of acids & metals, electrolysis, reactivity series • Interactive tools: PhET – States of matter & separation simulations, Seneca Learning – separating mixtures and acids & metals	• Pearsons Edexcel specification • Textbooks: CGP GCSE Physics, Collins KS4 Physics • Practical kits: Ripple tanks, slinky springs, light refraction prisms, radiation simulators • Videos/animations: BBC Bitesize – Waves, EM spectrum, Radioactivity • Interactive tools: PhET simulations for waves and EM radiation • Worksheets: Wave calculations, EM spectrum uses, safety scenarios for radiation

Key Questions					
1. What are the parts of an atom and how do they determine the properties of elements? 2. How do elements combine to form compounds, and how do mixtures differ from pure substances? 3. What are the different types of chemical bonding (ionic, covalent, metallic) and how do they affect substance properties? 4. What are the states of matter and how do particles behave during changes of state? 5. How can we observe and describe chemical reactions and explain them using the particle model?	1. What are the differences between plant, animal, and bacterial cells and their key structures? 2. How do cells divide and grow through mitosis and meiosis? 3. What is DNA, and how do genes and chromosomes control inherited traits? 4. How are characteristics inherited through dominant and recessive alleles? 5. How does variation, evolution, and genetic modification affect living organisms?	1. What are the different types of forces and how do they affect motion? 2. How can we calculate speed, velocity, and acceleration of moving objects? 3. What are Newton's laws of motion and how do they explain movement? 4. What are the different types of energy and how is energy transferred or conserved? 5. How do we calculate work, power, and efficiency in energy systems?	1. What are the differences between communicable and non-communicable diseases? 2. How do pathogens (bacteria, viruses, fungi, protists) cause disease and spread? 3. How does the human immune system protect the body from infection? 4. How do vaccines, antibiotics, and other treatments help prevent or cure disease? 5. How are medicines developed and tested, and what ethical considerations are involved?	1. What are the different methods of separating mixtures and when should each be used? 2. How can substances be broken down by chemical or physical methods like decomposition or electrolysis? 3. How do acids react with metals, alkalis, and carbonates**,** and what products are formed? 4. What is the reactivity series of metals**,** and how does it affect their reactions? 5. How do we measure, observe, and record chemical reactions safely in the lab?	1. What are the properties of waves (wavelength, frequency, amplitude, speed) and how are they measured? 2. What is the difference between transverse and longitudinal waves? 3. How do waves reflect, refract, diffract, and absorb in different materials? 4. What is the electromagnetic spectrum and what are the uses of different types of EM waves? 5. What are alpha, beta, and gamma radiation, how is half-life measured, and how can we stay safe around radioactive materials?

Are your learners on track?
Key performance indicators (The most important things to track. to assess how well learner is doing, to highlight success, progress or a problem

Indicators that learners are learning / making progress:	Indicators that learners are struggling / need support:
• Can **recall key facts and concepts** for the topic. • Can **use correct scientific vocabulary and symbols** in explanations. • Can **apply knowledge to answer questions or solve problems**. • Can **plan, carry out, and record practical work safely**. • Can **interpret and analyze data, graphs, and diagrams**. • Can **explain observations and results** using scientific reasoning. • Can **make connections between different science topics**.	• Cannot **recall or explain basic facts or concepts**. • Uses **incorrect or missing scientific vocabulary**. • Struggles to **apply knowledge** to questions or real-life examples. • Has difficulty **performing practical work safely or recording results**. • Struggles to **read, interpret, or analyze data and graphs**. • Cannot **explain observations or results logically**. • Cannot **see links between topics** or apply ideas to new situations.