CNCS

Year 9 Science (Chemistry & Physics & Biology)

Rationale: In Year 9, students will build on prior knowledge from Year 7 & 8. They develop and built on their key foundation concepts in Chemistry, Biology and Physics. Students will built upon the required practical learnt in the past years and develop upon on it – apply it to GCSE questions. Students will revisit and be introduced to a range of specific subject terminology, learning how to identify and discuss this appropriately. Furthermore, students will be given opportunities to develop their own personal responses to scientific problems and consider how to apply their knowledge to them.

A learner in Year 9 will know/ have studied:	**A learner in Year 9 will be able to:**
In Year 7, *Biology:* B1.1 Cells, B1.2 Reproduction, B1.3 Interdependence, ***Chemistry:*** C1.1 Particles, C1.2 Atoms, elements, compounds, C1.3 Mixtures, ***Physics:*** P1.1 Forces, P1.2 Space, P1.3 Energy, P1.4 Electrical circuits **In Year 8, *Biology:*** *B2.1* Tissues and Organs, B2.2 Respiration and Photosynthesis, B2.3 Life Diversity, **Chemistry:** C2.1 Changing substances, C2.2 Acids and alkalis, C2.3 Earth systems, **Physics:** P2.1 Movement and Pressure, P2.2 Magnetism, P2.3 Resistance	- Develop GCSE knowledge and practical skills in Chemistry, Biology and Physics topics. - Work safety in lab and carry out investigations. - Question, understand and apply the chemistry/ physics / biology knowledge to real life problems and scenarios.

Term	**Outline**	**Assessment**	**Home Learning**	**Key Skills/ End Point**

1	**B3.1 Growth and differentiation** Students will explore the fundamental differences between eukaryotic and prokaryotic cells, understanding their structures and functions. They will develop practical skills in aseptic techniques to safely study bacterial growth. Using microscopes, students will learn how to observe cells and apply scientific methods to analyse biological structures. The topic will cover cell transport mechanisms, including diffusion and osmosis, with hands-on investigations such as the osmosis practical. Additionally, students will examine cell division, its role in growth and repair, and its connection to cancer and stem cells. **C3.1 The periodic table** Students will develop a foundational understanding of atomic structure, exploring subatomic particles and how electronic configuration determines chemical properties. They will examine isotopes and their significance in science. The topic will trace the history of the atomic model, analysing how scientific ideas evolved over time. Students will explore the Periodic Table, focusing on the trends and reactivity of noble gases, alkali metals, halogens, and transition metals. Through practical investigations and historical analysis, students will enhance their scientific reasoning, develop problem-solving skills. **P3.1 Acceleration** Students will develop an understanding of motion by exploring speed, changing speed, and acceleration, using distance-time and velocity-time graphs to analyse movement. They will investigate Newton's Third Law, applying it to real-world scenarios. Practical activities will include an acceleration investigation, reinforcing experimental and data analysis skills. Students will learn how to interpret and use graphs to calculate speed, acceleration, and forces acting on objects. Through hands-on experiments, problem-solving, and real-life applications, students will enhance their scientific reasoning and mathematical skills.	**Formative Assessment:** **Pitstops: (Section 1 – Key knowledge, Section2 – Extended knowledge & Section 3- 4 to 6 marks) completed after every topic.** B3.1 Growth and differentiation C3.1 The periodic table P3.1 Acceleration **Summative assessment:** **1.2 End of Term assessment (B3.1, C3.1, P3.1)** **Skills Tested** AO1: Demonstrate knowledge and understanding of scientific ideas; scientific techniques and procedures. AO2: Apply knowledge and understanding of scientific ideas; scientific enquiry, techniques and procedures. AO3: Analyse information and ideas to: interpret and evaluate; make judgements and draw conclusions; develop and improve experimental procedures.	Set once per week via Educake	Students are able to recall key knowledge and apply this knowledge to exam questions from different areas. Students will interpret and then describe and explain what graphs show with reference to the data collected for a range of contexts. Students are able to analyse information given to them, and apply their knowledge gained through the course to evaluate data provided.

2	**B3.2 Human Interaction** Students will explore the importance of biodiversity and how human activities impact ecosystems. They will analyse the effects of pollution and global warming on biodiversity, considering the consequences of habitat destruction and climate change. The topic will introduce strategies to preserve biodiversity, including conservation efforts and sustainable practices. Students will also study pyramids of biomass to understand energy transfer in ecosystems and explore the role of farming and biotechnology in improving food security. Students will develop a deeper understanding of ecological balance and the importance of sustainable resource management. **C3.2 Introduction to quantitative chemistry** Students will develop essential skills in quantitative chemistry, learning to calculate relative formula mass and percentage by mass of elements in compounds. They will explore the principle of conservation of mass, applying it to balancing chemical equations. The topic will introduce uncertainty in measurements, emphasizing accuracy in scientific calculations. Students will also investigate concentration in solutions and methods for making soluble salts through neutralization reactions. Through practical experiments and analytical problem-solving, students will strengthen their mathematical and experimental chemistry skills. **P3.2 Heating** Students will explore the principles of internal energy and how energy is stored and transferred within a system. They will investigate different methods of thermal transfer, including conduction, convection, and radiation. The topic will introduce specific heat capacity (SHC) and its role in determining how materials store heat, supported by a SHC investigation to develop practical and data analysis skills. Students will also study specific latent heat, understanding the energy required for phase changes.	**Formative Assessment:** **Pitstops: (Section 1 – Key knowledge, Section2 – Extended knowledge & Section 3- 4 to 6 marks) completed after every topic.** B3.2 Human Interaction C3.2 Introduction to quantitative chemistry P3.2 Heating **Summative assessment:** **1.2 End of Term assessment (B3.2, C3.2, P3.2)** **Skills Tested** AO1: Demonstrate knowledge and understanding of scientific ideas; scientific techniques and procedures. AO2: Apply knowledge and understanding of scientific ideas; scientific enquiry, techniques and procedures. AO3: Analyse information and ideas to: interpret and evaluate; make judgements and draw conclusions; develop and improve experimental procedures.	Set once per week via Educake	Students will interpret and then describe and explain what graphs show with reference to the data collected for a range of contexts. Students are able to analyse information given to them, and apply their knowledge gained through the course to evaluate data provided. **Skills tested:** AO1: Demonstrate knowledge and understanding of: scientific ideas; scientific techniques and procedures. AO2: Apply knowledge and understanding of: scientific ideas; scientific enquiry, techniques and procedures. AO3: Analyse information and ideas to: interpret and evaluate; make judgements and draw conclusions; develop and improve experimental procedures.

3	**B3.3 Genetics** Students will explore the cell cycle, including mitosis and meiosis, to understand how cells divide for growth, repair, and reproduction. They will evaluate sexual and asexual reproduction in different organisms. The topic will trace the development of gene theory, leading to an understanding of DNA, proteins, and environmental influences on traits. Students will learn about genes, alleles, and inherited characteristics, using Punnett squares to predict inheritance patterns, including sex determination and inherited disorders. **C3.3 Using resources** Students will explore the reactions of metals, learning to observe and compare reactivity trends using the reactivity series. They will investigate methods for treating and testing water, understanding its importance for human health. The topic will also examine how materials are used, analysing their properties and applications. Students will study life cycle assessments to evaluate the environmental impact of different products and explore the principles of reduce, reuse, and recycle to promote sustainability. **P3.3 Sound and waves** Students will explore the types of waves, distinguishing between transverse and longitudinal waves, and investigate key wave properties such as wavelength, frequency, and amplitude. They will study the velocity of waves, learning how to calculate and measure wave speed. The topic will cover reflection and refraction, with practical investigations to analyse how waves behave when they interact with different surfaces and materials. **P3.4 Home electricity** Students will develop an understanding of mains electricity, including the role of plugs, safety features, and electrical power. They will explore power in circuits and its application in electrical appliances, learning how to calculate energy consumption and the cost of electricity. The topic will also cover different energy resources, comparing their efficiency and sustainability, and the function of the National Grid in electricity distribution. Additionally, students will investigate static electricity, exploring its causes, effects, and applications.	**Formative Assessment:** **Pitstops: (Section 1 – Key knowledge, Section2 – Extended knowledge & Section 3- 4 to 6 marks) completed after every topic.** B3.3 Genetic C3.3 Using resources P3.3 Sound and waves P3.4 Home electricity **Summative assessment:** **1.2 End of Term assessment (B3.3, C3.3, P3.3, P3.4)** **Skills Tested** AO1: Demonstrate knowledge and understanding of scientific ideas; scientific techniques and procedures. AO2: Apply knowledge and understanding of scientific ideas; scientific enquiry, techniques and procedures. AO3: Analyse information and ideas to: interpret and evaluate; make judgements and draw conclusions; develop and improve experimental procedures.	Set once per week via Educake	Students will interpret and then describe and explain what graphs show with reference to the data collected for a range of contexts. Students are able to analyse information given to them, and apply their knowledge gained through the course to evaluate data provided. **Skills tested:** AO1: Demonstrate knowledge and understanding of: scientific ideas; scientific techniques and procedures. AO2: Apply knowledge and understanding of: scientific ideas; scientific enquiry, techniques and procedures. AO3: Analyse information and ideas to: interpret and evaluate; make judgements and draw conclusions; develop and improve experimental procedures.