Manchester Academy
The best in everyone

Science Big Pictures 2025 – 2026

Year 9

Autumn 01	*Autumn 02*	*Spring 01*
Content: 9CR: chemical reactions This unit is the groundwork for much of the GCSE Chemistry – particularly the work on metal extraction, but also the ideas around useful materials from the Earth such as oil. The unit begins by recapping the work covered in year 8 on basic atomic structure and electron configuration and then adds on neutron numbers, atomic mass and formula mass. Writing chemical formula and balancing equations are brought together too, and this is a good place to start students writing symbol equations if they haven't already done so. Students find writing the formula and balancing the equation together really difficult – they frequently miss out the correct formula writing using ion charges – so there are lots of opportunities for differentiation here. At a minimum, students should be using the formula for common acids and attempting to balance simple equations provided. More able students may be able to use ion charges to write and balance whole equations. The skills are introduced in the first few lessons (writing ionic formulae, RFM and balancing equations) and can be consolidated throughout the unit. The unit deals with metal extraction, neutralization and salt preparation and oil as a resource. 9CE: chemical energetics This topic will introduce the idea of rates and factors that affect rates for the first time. How rates are measured is covered first, focusing on the element of time that is essential. There is a required practical, which uses the same reaction as the first lesson to avoid confusion and just allow the changing of concentration. The ideas of surface area and catalysts are introduced. If you have time, you could also do the effect of temperature here. The unit then covers types of reaction – endothermic, exothermic and then combustion, oxidation and thermal decomposition.	**Content:** 9PS: sound This unit builds on the work in year 8 on light waves and makes several links to it. The unit begins by reviewing the work from year 8 and establishing the different types of wave. Waves in matter are introduced and water and sound waves are used as examples of this. The idea of absorption of energy leading to an increase in the thermal store of a substance is revisited here too. The unit then looks at the speed of sound in different media and is a chance to revisit accurate language around particle theory. Then, uses of ultrasound and how microphones and loudspeakers work. The last lesson provides a chance to revisit electromagnetism and a galvanometer is a nice way of demonstrating the connection between electricity and magnetism. (start) 9BB: biological systems Working scientifically skills and oracy opportunity: Required practical echoes	**Content:** (finish) 9BB: biological systems This unit of work begins with a recap of organizational hierarchy, with students recalling the function of different organ systems. Students will then focus on the skeletal and muscular systems, considering how these two interact to produce movement and locomotion. Students will be introduced to the concept of antagonistic muscle pairings and will investigate the forces exerted by different muscles involved in movement. Students will then examine the respiratory system, looking at the mechanism of breathing, lung volumes and the role of diffusion in gas exchange. The impacts of drugs and exercise on the respiratory and other systems will be explored. Finally, students will consider the basis of life by investigating the structure and function of DNA. The work of key scientists and a model for inheritance will be introduced. Through this module students will be introduced to key biological concepts such as DNA as a blueprint for life and its link to cells, tissues, organs, organ systems and organisms. Topic B1: cell biology Working scientifically skills and oracy opportunity: Required practical muscle strength

Working scientifically skills and oracy opportunity: Required practical metal oxides and acids Required practical displacements Required practical metals and acids Required practical metal carbonates and acids Required practical effect of concentration on rate		
Assessment objectives: 9CR1 - Use patterns of reactivity to make predictions for chemical reactions 9CR2 - Link the properties and uses of a metal to its position in the reactivity series 9CE1 - describe combustion, thermal decomposition and oxidation 9CE2 - describe how a catalyst affects the rate of a reaction 9CE3 - describe the differences between an exothermic and endothermic reaction, and link these to energy changes End of topic tests in topics studied	**Assessment objectives:** 9PS1 - Compare light, mechanical and sound waves 9PS2 - Describe the process of reflection, absorption and superposition (add or cancel waves) 9PS3 - Compare human and animal auditory ranges using appropriate units 9PS4 - Describe uses of sound and ultrasound, including industrial and medical uses End of topic tests in topics studied	**Assessment objectives:** 9BB1 - Explain the functions of the skeleton and describe the function of antagonistic muscle pairings 9BB3 - Explain how the use of recreational drugs and smoking can affect biological systems, such as during gas exchange and gestation 9BB4 - Explain the respiratory system as a mechanism of breathing and gas exchange (to allow substances to diffuse) 9BB2 - Compare aerobic to anaerobic respiration, and describe the situations in which they occur 9BB5 - Describe how genetic material can be inherited, and the role of Watson, Crick, Wilkins and Franklin in the discovery of DNA structure End of topic tests in topics studied Big test 1: Mid year exam
Spring 02	***Summer 01***	***Summer 02***
Content: (finish) Topic B1: cell biology Cells are the basic unit of all forms of life. In this section we explore how structural differences between types of cells enables them to perform specific functions within the organism. These differences in cells are controlled by genes in the nucleus. For an organism to grow, cells must divide by mitosis producing two new identical cells. If cells are isolated at an early stage of growth before they have become too specialised, they can retain their ability to grow into a range of different types of cells. This phenomenon has led to the development of stem cell technology. This is a new branch of medicine that allows doctors to repair damaged organs by growing new tissue from stem cells (start) Topic C1: atomic structure and the periodic table	**Content:** (finish) Topic C1: atomic structure and the periodic table The periodic table provides chemists with a structured organization of the known chemical elements from which they can make sense of their physical and chemical properties. The historical development of the periodic table and models of atomic structure provide good examples of how scientific ideas and explanations develop over time as new evidence emerges. The arrangement of elements in the modern periodic table can be explained in terms of atomic structure which provides evidence for the model of a nuclear atom with electrons in energy levels.	**Content:** Topic P1: energy The concept of energy emerged in the 19th Century. The idea was used to explain the work output of steam engines and then generalized to understand other heat engines. It also became a key tool for understanding chemical reactions and biological systems. Limits to the use of fossil fuels and global warming are critical problems for this century. Physicists and engineers are working hard to identify ways to reduce our energy usage. Working scientifically skills and oracy opportunity: Required practical specific heat capacity

Working scientifically skills and oracy opportunity: Required practical microscopy Required practical osmosis		
Assessment objectives: 4.1.1.1. Eukaryotic and prokaryotic cells 4.1.1.2 Animal and plant cells 4.1.1.3 & 4 Cell specialisation & Cell differentiation 4.1.1.5 Microscopes 4.1.1.6 Culturing Microorganisms (Biology only) 4.1.2.1 Chromosomes 4.1.2.1 Mitosis and the cell cycle 4.1.2.3 Stem cells 4.1.3.1 Diffusion 4.1.3.2 Osmosis 4.1.3.3 Active transport End of topic tests in topics studied	**Assessment objectives:** 4.1.1.1 Atoms, elements and compounds 4.1.1.2 Mixtures 4.1.1.3 The development of the model of the atom 4.1.1.4 Relative electrical charges of subatomic particles 4.1.1.5 Size and mass of atoms 4.1.1.6 Relative atomic mass 4.1.1.7 Electronic structure 4.1.2.1 The periodic table 4.1.2.2 Development of the periodic table 4.1.2.3 Metals and non-metals 4.1.2.4 Group 0 4.1.2.5 Group 1 4.1.2.6 Group 7 4.1.3.1 Comparison with Group 1 elements (Chemistry only) 4.1.3.2 Typical properties (Chemistry only) End of topic tests in topics studied	**Assessment objectives:** 4.1.1.1 Energy stores and systems 4.1.1.2 Changes in energy 4.1.1.3 Energy changes in systems 4.1.1.4 Power 4.1.2.1 Energy transfers in a system 4.1.2.2 Efficiency 4.1.3 National and global energy resources End of topic tests in topics studied Big test 2: UL end of year papers