Holland Park School | Year 9: Science Overview

Overview	9BP Plants and Photosynthesis
	This unit provides the foundation for work in key stage 4 on limiting factors in photosynthesis, energy transfer through an ecosystem and the mineral requirements of plants. The unit starts with exploring the structure and function of roots, with emphasis on its adaptations. Pupils then progress on to the process of photosynthesis and its importance. This will include understanding that the carbon dioxide for photosynthesis comes from the air, that chlorophyll enables a plant to utilise light in photosynthesis, the role of the leaf in photosynthesis, the importance and roles of the xylem and phloem and the importance of photosynthesis to humans and other animals. The final section deals with the Earth in space, the cause of seasons and the Earth's place in the universe. Connections between this and light can be explored – light years, speed of light, how we see stars and planets etc.
	9PM Matter
	The matter topic build extensively on the particles (7CP) and forces and motion(7PF) topics. In this topic students will reinforce their understanding of the particle model, kinetic theory and resultant forces. They will learn to apply these to situations revolving around pressure and diffusion.
	9PF Forces in Action
	This unit builds on forces from year 7 to look at how forces can cause turning effects, how this can be amplified, how forces can cause deformation and what elastic deformation is, how forces are linked to energy (work done) and how machines can reduce the force needed to do a particular job. Lots of opportunity to make links with real life objects (bikes, cars, screwdrivers) engineering, tools etc. There is a lot of maths, although the relationships are simple, so challenge can be built by rearrangement and unit changes.
	9CR Reactivity
	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, particularly metals. 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 formulae 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 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

are consolidated throughout the unit whilst they look at a variety of chemical reactions. The latter part of the scheme introduces the reactivity series and how it can be used to predict and/or explain reaction outcomes. The required practical in this unit is displacement reactions and focusses on the application of the reactivity series. There are many opportunities within this scheme to interleave conservation of mass ideas by incorporating mass calculations that link directly to the reactions carried out.

9CE Energetics and Rates

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, combustion as a type of oxidation reaction and thermal decomposition.

9PS Sound waves

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 are introduced, and water and sound waves are used as examples. 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.

9BB Biological Systems and Processes

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.

GCSE Trilogy Biology B1

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

GCSE Trilogy Physics P1

	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.
	GCSE Trilogy Chemistry C1
	The periodic table provides chemists with a structured organisation 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.
Assessm ent	One assessment every half term.
	Assessments will test factual knowledge, application of that knowledge and working scientifically skills including (but not limited to): identification of independent variables, dependent variables and control variables; repeatability, reproducibility and resolution in readings; writing conclusions, using data to support conclusions; use of evidence in changing scientific ideas.