

Science Department Programme of Study: Combined Science BIOLOGY

	Year 7	Year 8	Year 9	Year 10	Year 11
Phase 1	<p>PRACTICAL SKILLS This unit introduces students to the practical nature of Science. It provides the fundamental practical skills that students will require and build upon over at least the next 5 years.</p> <p>7I – ENERGY & 8K FORCES This unit looks at food, energy stores and transfers, and energy resources. Introduction to forces.</p> <p>7F – Acids and alkalis This unit looks at acids and alkalis and how they are described using a pH number. It looks at neutralisation reactions and some of their uses, and reinforces standard hazard symbols.</p>	<p>7H – ATOMS, ELEMENTS AND COMPOUNDS This unit expands on particle theory and explains the difference between atoms, and molecules, elements and compounds, whilst linking these with the more abstract ideas of particle models, naming compounds and word equations.</p> <p>8E – COMBUSTION What are combustion and oxidation reactions, including those of hydrocarbons, metals and non-metals? The idea of an exothermic reaction is introduced and there is also a look at the pollution of the air by the products of fossil fuel combustion. There are opportunities to discuss the impact of global warming and methods for controlling carbon dioxide.</p>	<p>MICROSCOPE AND CELLS How to use a microscope and how developments in microscopy have allowed us to find out more about sub-cellular structure in plants, animals and bacterial cells How to apply magnification formula How cells are specialised and adapted to their functions</p> <p>BIOMOLECULES AND ENZYMES (cont Phase 2)</p>	<p>EXCHANGE AND TRANSPORT IN ANIMALS (End from Year 9 phase 4)</p> <p>HEALTH AND DISEASE (cont Phase 2) How we define Health About some pathogens, the diseases they cause and how their spread can be reduced or prevented How the body is protected against infections How the immune system works (mainly roles of lymphocytes and antibodies) How new medicines are developed</p>	<p>GENETICS How gametes are produced by meiosis Structure of DNA and how to extract it from cells How the inheritance of some characteristics occurs in families (Punnett squares, genetic diagrams and pedigree charts) Mutation and genetic variation (genome project) Variation / Inherited and environmental factors</p>
Phase 2	<p>7E – MIXTURES & SEPARATIONS This unit revises and builds on work in KS2 on materials, specifically on mixtures, solutions and separation techniques using the context of providing clean drinking water. This consolidates the practical skills acquired in Phase 1.</p> <p>7A – CELLS, TISSUES, ORGANS & SYSTEMS This unit starts by reminding students about the features of organisms MRS GREEN, and then looks at organ systems, organs, tissues and cells. This includes looking at how microscopes have changed and the discoveries it has led to.</p>	<p>8K – ENERGY TRANSFERS This unit looks at energy transfers by heating in the context of homes.</p> <p>7L – SOUND This unit looks at how sounds are made, transmitted and detected, some uses of sound and compares sound wave with waves on the surface of water.</p> <p>8J – LIGHT This unit revises work from KS2 on light, which is then extended to consider how light travels and what happens when it meets an object. The unit is set in the context of stage, film and illusions.</p> <p>9A – GENETICS & EVOLUTIONS This unit recaps ideas about the causes of variation and then looks at inherited variation in more detail. DNA is introduced before students consider how inherited genes can affect an organism’s survival. The unit ends with coverage of natural selection.</p>	<p>BIOMOLECULES AND ENZYMES What biomolecules are and their uses (proteins, lipids and carbohydrates, nucleic acid will be seen in Y11) How to carry out food tests and calorimetry How enzymes work and their importance in nutrition, growth and development How enzymes are affected by pH, temperature substrate concentration</p> <p>MOVEMENT IN AND OUT OF CELLS (cont Phase 3)</p>	<p>HEALTH AND DISEASE (end from phase 1)</p> <p>HORMONES AND MENSTRUAL CYCLE What hormones are and how they work Identify endocrines glands in human body and their role Understand about negative feedback and how the level of thyroxine is controlled Effects of thyroxine and adrenaline on the body How the menstrual cycle is controlled by hormones and how hormones are used in contraception or ART Understand the importance of homeostasis How blood glucose concentration is controlled and about diabetes</p>	<p>NATURAL SELECTION AND GENETIC MODIFICATION Evidence for evolution (fossils, tools) Darwin’s theory of evolution by natural selection How different methods, including genetic analysis, are being used to investigate evolution How organisms are classified How selective breeding and genetic engineering are carried out – benefits and drawbacks</p> <p>REVISION (cont phase 3)</p>
Phase 3	<p>7G – THE PARTICLE MODEL This unit develops an understanding of the different properties of solids, liquids and gases. Scientific method and ideas on experiments, observations, hypotheses and theories are discussed, leading to an understanding of the particle theory of matter.</p> <p>7K – FORCES This unit revises the concepts of forces and their effects and extends students’ knowledge of friction, gravity and springs. These ideas are presented using a theme of outdoor sports, such as climbing and mountain biking, to link to ideas about forces, friction and pressure.</p> <p>8I - FLUIDS This unit looks at changes of state, and then goes on to look at fluids and some of their effects, including pressure, floating and sinking, and drag.</p>	<p>8D – UNICELLULAR ORGANISMS Under the broad theme of their uses, this unit takes a detailed look at what unicellular organisms are, the differences between different types, their problems and their uses.</p> <p>8C – BREATHING AND RESPIRATION Under the broader theme of water sports, this unit covers gas exchange in humans and other organisms, together with details of aerobic and anaerobic respiration in humans.</p> <p>9B – PLANT GROWTH This unit looks at photosynthesis and aerobic respiration in plants in more detail, and then considers plant adaptations. The products we get from plants are then looked at, before studying farming methods and their problems.</p>	<p>MOVEMENT IN AND OUT OF CELLS How substances are carried by diffusion, osmosis and active transport How to find out the concentration of solutes in potatoes</p> <p>MITOSIS AND GROWTH Stages of mitosis and importance of mitosis in growth, repair and asexual reproduction Growth in animal and plants and how to interpret graphs (eg percentile growth curves) How cells become specialised and the importance of stem cells</p> <p>THE NERVOUS SYSTEM (cont Phase 4)</p>	<p>PLANT STRUCTURES AND FUNCTIONS Role of photosynthesis and how different factors affect its rate Know the leaf structure and adaptation and role of stomata and guard cells How rate of water uptake by a plant is affected by different factors How the reactant and products of photosynthesis are transported (transpiration and translocation)</p>	<p>REVISION</p>
Phase 4	<p>8A – DIGESTION & BALANCED DIET This unit looks at the main components in the human diet and why they are needed. The digestive system is also covered in some detail, and the idea of enzymes is introduced.</p> <p>7B – ASEXUAL & SEXUAL REPRODUCTION This unit explores sexual reproduction in animals, in the context of efforts being made by zoos to prevent endangered species becoming extinct. However, the central focus for learning is the human reproductive system and sexual reproductions in humans.</p> <p>7J – CURRENT ELECTRICITY This unit looks at the measurement of current and how it behaves in series and parallel circuits, and at voltage and resistance. Various models for thinking about what is happening in circuits are explored, and the unit concludes by looking at how we use electricity safely.</p>	<p>8F – THE PERIODIC TABLE This unit examines and strengthens the students’ understanding of matter, atoms and chemical and physical change. Students then look at using the trends in the periodic table to make predictions about physical and chemical properties of elements and their compounds.</p> <p>8G – METALS & THEIR USES This unit builds upon the students’ knowledge and understanding of common physical properties of metals, and to introduce their main chemical properties. The idea that reactions can occur at different speeds is also illustrated, leading to the introduction of the general reactivity series of metals.</p> <p>9F – REACTIVITY This unit reviews physical change and gas pressure, and then the reactivity series and a chemical method of preventing rusting are covered. Exothermic and endothermic reactions are introduced, followed by displacement reactions. Calculation of percentage change is related to oxidation and thermal decomposition reactions.</p>	<p>ELECTRICITY AND CIRCUITS Current, Charge and Potential difference Series and parallel circuits How to calculate resistance, power and energy transferred The components which have changing resistance</p>	<p>MAGNETS AND MAGNETIC FIELDS About permanent and induced magnets, and how to represent a magnetic field About the magnetic field around a current in a wire and the factors that affect it How the fields from the individual coils in a solenoid interact How to work out the size and direction of the force on a wire carrying a current in a magnetic field</p> <p>FORCES AND MATTER About elastic and inelastic distortion The relationship between force and extension, and how to calculate the extension and spring constant How to calculate the work done when stretching a spring</p>	STUDY LEAVE
END OF YEAR EXAM	END OF YEAR EXAM	END OF YEAR EXAM			
<p>7D – ECOSYSTEMS With a general theme about adaptations, this unit looks at ecosystems and the factors that affect them. This includes the impact of human activity and the importance of biodiversity.</p>	<p>8L – EARTH & SPACE & 9I FORCES This unit builds on work from KS2 on the Solar System and looks at the Earth, including the seasons and the Earth’s magnetic field and gravity. It also looks at the Solar System and what is beyond the Solar System, whilst revising some aspects of forces and their effects, energy stores and transfers. It then looks at calculations of speed and relative speed and representing journeys on distance-time graphs.</p>				