KS5

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C6: Global challenges
Unit topics:
Methods to extract metals (iron and aluminium), Biological metal extraction. Selecting the right materials, recycling. Crude oil distillation and cracking hydrocarbons. Formation of the atmosphere, pollution and climate change.
Producing drinking water.

P6: Global challenges
Unit topics:
Everyday motion of cars and factors affecting stopping distance, including reaction time, thinking distance and braking distance.
Energy sources for the production of electricity, the nation grid and mains electricity to the home.

C5: Monitoring and controlling chemical reactions
Unit topics:
Define methods to measure the rate of a reaction. Investigate the effect of temperature, concentration, pressure, particle size and catalysts on the rate of a reaction.
Describe reversible reactions. Explain equilibrium in reversible reactions, how reaction conditions affect this position and how they are controlled.

P5: Energy transfers
Unit topics:
Energy stores and transfers, including analysis of energy transfers in everyday situations. Calculation of power and efficiency. Analysis of insulation methods in house building and other situations.

B6: Global challenges
Unit topics:
Environmental sampling, loss and maintaining biodiversity. Selective breeding, genetic engineering and the use of biotechnology in farming. Health and disease, including communicable diseases in animals and plants. Human body defence mechanisms, vaccination and the treatment of communicable and non-communicable diseases.

B4: Ecosystems
Unit topics:
Abiotic and biotic factors affecting ecosystems. Competition and interdependence. Nutrient and carbon cycles.

C4: Predicting and identifying reactions and products
Unit topics:
The properties and trends in groups 1, 7 and 0 elements of the periodic table. Halogen displacement reactions and element reactivity.

P4: Waves and radioactivity
Unit topics:
Properties of transverse and longitudinal waves. Mechanical waves verses electromagnetic waves. Trends in the electromagnetic spectrum, uses and dangers of EM radiation.
Radioactive decay, alpha, beta and gamma radiation, nuclear equations, half-life and emission / absorption spectra.

B5: Genes, inheritance, and selection
Unit topics:
Variation within a species, meiosis, inheritance due to alleles and genetic crosses, mutations. Natural selection, evidence of evolution and classification systems.

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P2: Forces
Unit topics:
Distance, time and speed, vectors and scalars, acceleration, D-T and V-T graphs, equations of motion and kinetic energy, free body diagrams, Newton's Laws, momentum, work and power, elastic objects and elastic potential energy, gravitational potential energy.

B3: Organism-level systems
Students expand on their prior learning to learn about the nervous and endocrine systems, along with how and why the body controls blood sugar levels.

C3: Chemical reactions
Unit topics:
Chemical formulae, conservation of mass, chemical equations, half equations, detecting gases, concentration and the mole, exothermic and endothermic reactions, reaction profiles, redox reactions, the pH scale, neutralisation, electrolysis and electroplating.

P3: Electricity and magnetism
Unit topics:
Electrostatics, electric current, series and parallel circuits, potential difference, resistance, Ohm's Law, LDRs and thermistors, electrical power, magnetic fields, currents and fields, currents and forces, electric motors.

B1: Cell level systems
Students will identify structures and function of parts of animal, plant and bacterial cells. They will also cover the processes of photosynthesis and aerobic respiration, and factors that affect the rate of each process.

C1: Particles
Unit topics:
Particle theory, chemical and physical changes, atomic structure, isotopes, development of the atomic model.

P1: Matter
Unit topics:
Evolution of the model of the atom, density, energy and temperature, specific heat capacity, specific latent heat and gas pressure.

B2: Supplying cells in different organisms
This unit covers the movement of substances in/out and around organisms, cell differentiation, the human circulatory system and plant transport systems.

C2: Elements, compounds and mixtures
Unit topics:
Relative formula mass, Empirical formula, pure and impure substances, filtration, crystallisation, distillation, chromatography, purification, metals and non-metals, electronic structures, forming ions, ionic compounds, simple molecules, giant covalent structures, polymers, the periodic table, carbon structures, changing state.

Biology transition: Energy in living organisms
Students will investigate energy uses in plans and animals, measure the energy in different foods and look at the effect of exercise on the body. They will also look in detail at the processes involved in planning and analysing investigations, in preparation for KS4.

Chemistry transition
A project looking at detergents and perfumes, looking at how they work and are produced. Pupils will also have an opportunity to extract essential oils from plants.

Physics transition
Students will expand on their knowledge of scientific investigation processes, in a series of physics based investigations.

KS4

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P5: Energy in fuels
An introduction to energy stores and transfers, including a review of conduction, convection and radiation. Students will research energy sources, including renewable and non-renewable resources.

B6: Global challenges
Beginning with a recap of organ systems, diffusion and osmosis, students will expand on their knowledge of plant organs and transport systems, photosynthesis and the water cycle.

C6: Global resources
Students will learn about rock types, the rock cycle, metal extraction, the carbon cycle, how out atmosphere has changed over time and climate change.

P6: Space and gravity
Looking further, students will research the night sky, our solar system and the effect of different gravitational fields.

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B4: Ecosystems
Investigating the world around us. Topics covered are the use of sampling an ecosystem, biodiversity, food chains and security, competition and interdependence, along with the importance of the water cycle.

C4: Groups in the periodic table
Students will expand on their knowledge of elements to explore the properties of elements in groups 1, 7 and 0 of the periodic table. Also covering the development of the periodic table.

P4: Waves
Students will learn about and investigate different types of wave and their properties. Reflection, refraction, light and colour, the eye, sound and detecting sound are all covered in this unit.

B5: Genes, DNA and chromosomes
Pupils will look at the importance of variation within a species, and how this links to ideas about natural selection & Darwin's theory of evolution.

C5: Controlling chemical reactions
Building on prior knowledge of particle theory, students will apply this to the factors that affect and can be used to control the rate of a chemical reaction.

P2: Particles and energy
Students will investigate the effect of resultant forces and the motion of objects. Looking at speed, friction, air resistance, drag, distance time graphs and elastic objects.

B3: Organ systems 2 (reproduction)
Students will plant and animal reproduction, including pregnancy, twins, plant fertilisation and the role of hormones in these processes.

C3: Chemical reactions
Building on prior learning, students will learn about different chemical reactions, how to write chemical equations and the pH scale. Including neutralisation, combustion and decomposition.

P3: Electricity and magnetism
Using knowledge of atomic structure, students will investigate static electricity, current, potential difference and resistance. They will also learn about magnets and magnetic fields.

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B1: Cells
Students will identify structures and function of parts of animal and plant cells. They will also cover the processes of photosynthesis and aerobic respiration, and how to use a microscope.

C1: Particles
Students will learn about the particle arrangement in the three states of matter, the difference between physical and chemical changes, along with the structure of atoms and the three subatomic particles.

P1: Particles and energy
Students will expand on their knowledge of particles to explore the difference between energy and temperature, and pressure in solids, liquids and gases. They will then look at thermal energy transfer and insulation.

B2: Organ systems
Prior learning on cells will be expanded to learn about tissues, organs and organ systems, including skeletal, circulatory and digestive systems.

C2: Elements & separation techniques
Knowledge of atomic structure will be used to investigate the periodic table, elements, compounds and mixtures. Students will then investigate the different separation techniques.