

Science Overview of KS4 Curriculum Topics

Term	Year 10	Year 11
1	<p>Chemistry 2: <u>Structure and bonding:</u> Students learn about ionic, covalent and metallic bonding and structures. <u>Structure and property:</u> Students learn about the properties of each simple covalent, giant covalent, ionic lattice and metallic structures. They also learn about the nan science as well as its advantages and disadvantages. <u>Half of "How much"</u></p>	<p>Biology 3: <u>Exchange of materials:</u> Students learn about osmosis and active transport to understand how materials move in and out of a cell in both plants and animals. They also learn about the respiratory system, how the structure of alveoli helps with efficient gas exchange and what artificial breathing aids are available for patients with breathing problems. <u>Transporting materials:</u> Students learn about the human's circulatory system and how the heart and lungs work together to oxygenate the deoxygenated blood, the blood composition, and materials dissolved in them and what they do. They also learn about the transport of materials in plants. <u>Keeping internal conditions constant:</u> Students learn how the thermoregulatory system in our body works to control the body temperature and how the pancreas produces insulin and glucagon to control the blood glucose levels. They also learn about the kidneys' function and treatments such as dialysis and transplant which are widely used to treat kidney failure. <u>How humans can affect the environment:</u> Students learn about deforestation and its effect on the environment, they also learn how biogas is produced from animals' wastes and how sustainable foods are produced and important to humans as the world's population is growing exponentially.</p>
2	<p><u>The remaining of "How much":</u> Students learn about the importance of balancing equations into calculating moles, reacting masses and empirical formula. This chapter enables them to appreciate the importance of conservation of mass in industries. <u>Rates and energy:</u> Students learn how temperature, concentration or pressure, surface area and catalyst affect the rate of everyday as well as industrial chemical reactions.</p>	<p>Chemistry 3: <u>The periodic table:</u> Students learn about the early periodic table vs. the modern one used today; the reaction of group 1 and 7 elements as well as properties of transition metals. <u>Water:</u> Students learn about soft water, hard water, how hardness is removed and how water is treated. <u>Energy calculations:</u> Students learn how to calculate</p>

	<p><u>Salts and electrolysis:</u> Students learn about acids, alkalis, neutralisation reaction leading to formation of salts; how to name a salt based on the acid used; how to separate an ionic compound by electrolysis and how electrolysis is used to plate old metals and objects to save money and resource.</p>	<p>energy released from fuels, how to draw energy transfer diagrams for exothermic and endothermic reactions and how to calculate the bond energies.</p>
3	<p>Biology 2: <u>Cells, tissue and organs:</u> Students learn about specialised cells and digestive system; digestive enzymes and how they are important in digesting fats, proteins and carbohydrates. <u>Organisms in the environment:</u> Students learn about limiting factors of photosynthesis and how each can limit the rate; different methods of sampling plants' distributions and how physical factors affect these. <u>Enzymes:</u> Students learn about how different enzymes (lipase, protease, amylase) in digestion, industry and medicine work at various temperature and pH.</p>	<p><u>Analysis and synthesis:</u> Students learn how to test for positive and negative ions, how titration works and how to calculate the reacting masses using concentration and moles, how ammonia is made in Haber process and what equilibrium in a reaction means. <u>Organic chemistry:</u> Students learn about the structure, properties and uses of alcohols, carboxylic acids and esters in everyday life. Physics 3: <u>Medical applications of physics:</u> Students learn about x-rays, ultrasound and endoscope in diagnosing problems in medicine. They also explore the world of lenses, the eye's structure and how images are formed at the back of our eyes. <u>Using physics to make things work:</u> Students learn about moments and how to calculate this, centre of mass and its importance in stability, hydraulics and importance in mechanical diggers, circular motion and the pendulum. <u>Using magnetic fields to keep things moving:</u> Students learn about the electromagnets and how they work, the electric motors, transformers and their uses in converting voltage to what is needed at homes.</p>
4	<p><u>Energy from respiration:</u> Students learn about aerobic and anaerobic respiration; the effect of exercise on our body and oxygen debt during vigorous exercise. <u>Simple inheritance in animals and plants:</u> Students learn about genetics, DNA, genes, dominant and recessive alleles, cell divisions, stem cells and its uses in medical therapeutics. <u>Old and new species:</u> Students learn about fossils and how information about evolution can be derived from these;</p>	<p>ISA (Investigative skills assessment 25% of GCSE) and Preparation for GCSE terminal exams</p>

	how new species arise as a result of geographical isolation and natural selection.	
5	<p>Physics 2:</p> <p><u>Motion:</u> Students learn about distance-time and velocity-time graphs to calculate speed and acceleration.</p> <p><u>Forces:</u> Students learn about different types of forces, resultant forces and the effect of balanced and unbalanced forces on objects' movements.</p> <p><u>Work, energy and momentum:</u> Students learn about kinetic and gravitational potential energy, how work done and conserved momentum in a closed system is calculated.</p>	GCSE Exams
6	<p><u>Current electricity:</u> Students learn about the current, voltage and resistance in series and parallel circuits. They also explore different electrical components' functions such as LDR, thermistor and diode in a circuit.</p> <p><u>Mains electricity:</u> Students learn about the ac & dc currents, three pin plugs, the voltage and frequency of mains in the UK and how to calculate the frequency of an ac current from an oscilloscope trace. They also learn about the importance of fuses and circuit breakers in keeping safe.</p> <p><u>Radioactivity:</u> Students learn about the radioactivity of uranium and plutonium; how each decay to form alpha, beta and gamma and how each particle/radiation can be used in everyday life such as in medicine (tracing and diagnosing problems).</p> <p><u>Energy from the nucleus:</u> Students learn about two nuclear processes; fission (used in generating electricity) and fusion (powers the stars like our Sun).</p>	Summer Holiday

Subject Leader:	Mrs Rojan Zarrabi	Date updated:	December 2016
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