KS4 Curriculum Overview - SCIENCE

YR 10	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
Content	Unit 1: Building Blocks States of matter Matter & particles Density Internal energy Specific heat capacity Specific latent heat **Summative assessment 1** Atomic Structure Scientific models of the atom Sub-atomic particles Electronic structures **Summative assessment 2**	Unit 1: Building Blocks Cells in animals and plants Eukaryotic and prokaryotic cells Diffusion Osmosis Active transport Cell division **Summative assessment 3** Waves The nature of waves Light, infrared, microwaves & radiowaves Communications Ultraviolet, x-rays, & gamma rays X-rays in medicine **Summative assessment 4**	Unit 6: Interactions over small and large distances Forces and energy changes Vectors and scalars Forces between objects Resultant forces Forces and elasticity **Summative assessment 5** Structure and bonding Atoms into ions Ionic bonding Giant ionic structures Covalent bonding Structure of simple molecules Giant covalent structures Bonding in metals **Summative assessment 6** Magnetism and electromagnetism Magnetic Fields Electromagnetism **Summative assessment 7**	Unit 3: Interactions with the environment Lifestyle and health Non-communicable diseases Smoking & the risk of disease Diet, exercise and disease Alcohol and other carcinogens Principles of homeostasis The control of blood glucose levels Human reproduction **Summative assessment 8** Radiation and risk Atoms and radiation Radioactivity Nuclear charges Penetrating properties of radiation Radiation hazards **Summative assessment 9**	Unit 3: Interactions with the environment Preventing, treating, and curing diseases Pathogens & disease Preventing infections Viral diseases Bacterial diseases Human defence responses Vaccination Antibiotics and medicine Stem cells in medicine **Summative assessment 10**	Unit 8: Guiding spaceship Earth to a sustainable future Carbon chemistry Fullerenes & graphene Hydrocarbons Fractional distillation of oil Cracking hydrocarbons **Summative assessment 11** Resources of materials and energy Extracting metals Energy demands Energy from wind and water Solar power Energy & the environment Reduce, reuse, recycle **Summative assessment 12**

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Key new knowledge	**States of matter:** Name the changes of state Changes that occur in terms of energy changes & particle behaviour. Calculate density. Measure specific heat capacity & latent heat of vaporisation. **Atomic Structure:** Sub-atomic particles & structure of an atom. Use the periodic table to deduce the number of sub-atomic particles in atoms, ions, & isotopes. Rules of placing electrons in each energy level of an atom. Standard electronic notations and	**Cells in animals & plants:** Movement occurs in diffusion, osmosis, and active transport. Interpret diagrams showing diffusion, osmosis, and active transport. Mitosis and meiosis, relating to cell division. **Waves:** Amplitude, wavelength, peak, and trough of a wave. Wave equations Different parts of the electromagnetic spectrum.	**Forces and energy changes:** Examine physical quantities The nature and representation of vectors and scalars The action of individual forces on objects Newton's First Law of motion Energy changes Apply concepts of elastic behaviour and linear stretching **Structure and bonding:** Different types of bonding in substances Formation of ions Formation of ionic and covalent bonds Formation of alloys	**Lifestyle and health:** Lifestyle factors that can affect health The difference between communicable and non-communicable diseases Different treatments for cardiovascular disease, the risks and benefits associated with treatment Homeostasis in the body and the control of blood sugar levels Causes, effects, and treatments of type 1 and type 2 diabetes **Radiation and risk:** What happens when atoms lose energy Measuring radioactivity Radioactive decay in the form of a nuclear equation	**Preventing, treating, and curing diseases:** How disease affects the body How diseases are caused by pathogens Methods to prevent the spread of disease The body's different defence mechanisms How vaccination works Uses of other medicinal drugs; antibiotics and painkillers Double-blind trials Recent advancements in the treatment of diseases The role of genetic modification and stem cells in modern medicine	**Carbon chemistry:** The structure, properties, and uses of large carbon molecules, fullerenes, and graphene's The structure of the first four alkanes (methane, ethane, propane, and butane) Complete and incomplete combustion of hydrocarbons The structure of the alkenes produced in cracking **Resources of materials and energy:** Extraction of metals from their ores The extraction of aluminium from its oxide through electrolysis The UK's energy demands and ways to meet this demand

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	electronic structure of some elements.		**Magnetism and electromagnetism:** Magnetic fields in terms of field lines or lines of force Explore the shape of fields The magnetic effect of a current-carrying wire.	Calculate half life Hazards associated with radiation, including cancer Different causes of cancer Benefits and risks of treatments available for cancer		How systems can be analysed in terms of energy Calculate the efficiency of a range of energy transfer processes
Assessments	End of chapter summary questions. Required practical notes and observations. Retrieval tasks. Practice exam questions.	End of chapter summary questions. Required practical notes and observations. Retrieval tasks. Practice exam questions.	End of chapter summary questions. Required practical notes and observations. Retrieval tasks. Practice exam questions.	End of chapter summary questions. Required practical notes and observations. Retrieval tasks. Practice exam questions.	End of chapter summary questions. Required practical notes and observations. Retrieval tasks. Practice exam questions.	End of chapter summary questions. Required practical notes and observations. Retrieval tasks. Practice exam questions.

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Content	Unit 5: Building blocks for understanding The periodic table Development of the periodic table Group 1 – the alkali metals Group 7 – the halogens **Summative assessment 1** Chemical quantities Atoms, elements & compounds Chemical equations Relative masses & moles Concentrations of solutions **Summative assessment 2**	Unit 2: Transport over larger distances Systems in the human body Exchanging materials The blood The heart Breathing & gas exchange How the digestive system works The human nervous system Reflex actions Principles of hormonal control **Summative assessment 3** Plants & photosynthesis Specialised plant cells Plant tissues & organs Evaporation & transpiration Photosynthesis Plant diseases Chlorophyll & chromatograms **Summative assessment 4**	Unit 7: Movement & Interactions Forces and motion Speed & distance-time graphs Velocity & acceleration Analysing motion graphs Free fall & terminal velocity **Summative assessment 5** Electricity Series circuits Parallel circuits Direct & alternating currents Energy & power **Summative assessment 6** The rate and extent of chemical change Measuring rate of reaction Collision theory & surface area The effect of temperature The effect of concentration The effect of catalysts Reversible reactions **Summative assessment 7**	Unit 4: Explaining change The Earth's atmosphere History of the Earth's atmosphere Material recycling The Carbon Cycle The greenhouse effect Atmospheric pollutants Potable water **Summative assessment 8** Ecosystems and biodiversity Organisation in ecosystems Feeding relationships Competition in animals and plants Field investigations **Summative assessment 9** Inheritance, variation & evolution DNA & the genome Inheritance in action Variation Evolution by natural selection Classification systems Selective breeding Genetic engineering **Summative assessment 10**	Exam Preparation Exams	Exam Preparation Exams

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Key new knowledge	**The Periodic Table:** The development of the Periodic Table from its experimental origins Interpret chemical formulae Physical and chemical properties of group 1 and group 7 elements Electron configurations **Chemical quantities:** How chemical symbols are used and what they represent Skills in writing chemical equations for different reactions Balancing equations Relative atomic mass and relative formula mass for compounds	**Systems in the human body:** Outline the processes that occur in the gas exchange system, circulatory system, digestive system, nervous system, and endocrine system Identify the different blood vessels and major components of blood know the major parts of the nervous and endocrine systems **Plants & photosynthesis:** The adaptation of cells and tissues in a plant The requirement of photosynthesis Process of transpiration Chromatography to separate pigments or dyes	**Forces and motion:** Analyse distance-time graphs Use the speed equation Analyse motion using using velocity-time graphs Analyse motion using using concepts of kinetic energy and energy transfer **Electricity:** Calculate the charge flow in an electric circuit Calculate the power of an electrical appliance Work out potential difference and resistance in an electric circuit	**The Earth's atmosphere:** The effects of human activity on air and water quality Why has the atmosphere of the Earth has changed? Causes of the greenhouse effect Formation of acid rain Changes in carbon cycle and water cycle **Ecosystems & biodiversity:** Resources that organisms compete for Organisms living interdependently Reasons for population changes Predator-prey relationships Conduct a field investigation Use quadrats and transects Eutrophication and bioaccumulation Effect of increasing human population	Study leave Revision Revision booklets	Study leave Revision Revision booklets

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	Calculating the concentration of a solution			Effects of deforestation and pollution **Inheritance, variation and evolution;** Variation - genes and the environment Sex characteristics and monohybrid inheritance Genetic diagrams and probability of inheritance characteristics Genotypes and phenotypes of parents and offspring Process of evolution Mechanism of natural selection Classification systems Selective breeding and genetic engineering for inherited characteristics		

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Assessments	End of chapter summary questions. Required practical notes and observations. Retrieval tasks. Practice exam questions.	End of chapter summary questions. Required practical notes and observations. Retrieval tasks. Practice exam questions.	End of chapter summary questions. Required practical notes and observations. Retrieval tasks. Practice exam questions.	End of chapter summary questions. Required practical notes and observations. Retrieval tasks. Practice exam questions.		