

SUBJECT: Science



CURRICULUM PLAN

KS1 and 2
Knowledge and
Key skills

YEAR 7	AUTUMN 1	AUTUMN 2	SPRING 1	SPRING 2	SUMMER 1	SUMMER 2
TOPIC	<i>Bridging unit, Cells, Particles</i>	<i>Electricity and current, Cell organisation</i>	<i>Atoms, Elements, Compounds, Magnets</i>	<i>Chemical Reactions, Heating and Cooling</i>	<i>Body systems, pure and impure,</i>	<i>Gravity, Reproduction</i>
Knowledge	Health & Safety, Equipment and Measuring, Structure of animal and plant cells, bacteria and unicellular organisms, Properties of particles, Structure of an atom	electrical circuits, measuring current, voltage and resistance, static electricity, diffusion and examples in the lungs	Sub atomic particles, arrangement of atoms in elements and compounds, Periodic Table, properties and uses of magnets.	The transfer of heat energy and definitions of conduction, convection and radiation. Representing equations using arrows to separate reactants and products. Some simple important reactions.	Definition of pure and impure substances. How mixtures can be separated, chromatography, distillation. Structure and function of major body systems including digestive system	Structure of flowers, plant reproduction and dispersal of seeds, structure and function of human reproductive system, puberty, pregnancy and birth. Gravity as a force and the structure of the Solar system. Gravity is different on different planets
Skills	Recognise hazards and risks when prompted. Identify and use the most common laboratory equipment. The principles of sampling as applied to scientific data, Draw a bar chart, calculate a mean. Observation of cells, use of microscopes. Preparing and interpreting a cooling curve	Identify one or more control variables and significant other variables. Identify. Plot 2 variables on graph from scientific data, use expressions in decimal form, substitute numerical values into algebraic equations. Explain a process using scientific language	Select appropriate apparatus from those provided and use with guidance. Making accurate measurements. Calculating percentages. Draw a magnetic field	Constructing cooling curves. Suggest significant variables in an investigation. Constructing and interpreting tables and diagrams. Balancing equations. Plotting 2 variables from experimental data.	Suggest improvements to working methods. Selecting the most appropriate apparatus and method to separate a substance. Relate structure to function. Make some accurate observations or whole number measurements to questions and ideas under investigation.	Suggest improvements to working methods. Selecting the most appropriate apparatus and method to separate a substance. Constructing bar charts of gestation in different animals. Use units of mass and weight
Key Vocab	Hazard, Risk, Bunsen burner, beaker, measuring cylinder, Nucleus, chloroplast, cytoplasm, cell membrane, cell wall, mitochondria, ribosomes, vacuole, atom, particle, melting, boiling, condensing, evaporating, solid, liquid, gas	diffusion, gradient, lungs, bronchi. Trachea, alveoli, current, voltage, resistance, static	Nucleus, atom, element, compound, Periodic Table, atomic number, poles, magnets, compass, field, electromagnet	equations, combustion, thermal decomposition, reactants, products, equations, reactants, products, combustion	Oesophagus, stomach, intestine, rectum, enzymes, heart, joints, skeleton, impure, compound, separation, filtering, evaporating, chromatography, distillation	Stigma, style, stamen, anther, carpel, penis, testicles, gland, ovary, oviduct, uterus, vagina, cervix, fertilisation, gestation, umbilical cord. Gravity, force, Newton, orbit, weight, mass

Key Knowledge Transfer

YEAR 8	AUTUMN 1	AUTUMN 2	SPRING 1	SPRING 2	SUMMER 1	SUMMER 2
TOPIC	<i>Bridging unit, Acids and alkalis, balanced and unbalanced forces</i>	<i>Light and Variation</i>	<i>Energy transfer and Healthy living</i>	<i>Sound, Chemical reactions and Space</i>	<i>Motion, Energy in Reactions and Evolution</i>	<i>Photosynthesis, Heating and Cooling, rocks</i>
Knowledge	Determining pH using indicators and uses of acids and alkalis. Neutralisation definition and examples, Balanced and unbalanced forces, Hooke's law, contact and non contact forces, Units of force	Properties of light waves, reflection and refraction, light dispersal, seeing colour, use of wave equation Variation in organisms, continuous and discontinuous variation, environmental and inherited characteristics. Chromosomes, genes and the structure of DNA.	A healthy diet, growth of bacteria, food tests. Examples of viruses (Covid). Drugs and their effects. Energy transfers in systems. Input/output energy, Sankey diagrams, calculating efficiency. Energy resources and generating electricity.	examples of sedimentary, metamorphic and Igneous rocks and how they are formed, rock cycle. Balanced equations, conservation of mass, combustion, endothermic and exothermic reactions. The properties of sound, pitch, amplitude, wavelength, frequency, use of wave equation, the ear. Position of the earth in space and resulting night, day, seasons, light years.	Calculations of speed, distance, time, gravitational force and explaining terminal velocity. Changes of state, exothermic and endothermic reactions. The mechanism of evolution by natural selection proposed by Charles Darwin	Importance of minerals to plants, Photosynthesis word equation, Starch testing of leaves, structure and function of leaves. Investigating factors that affect the rate of photosynthesis. carbon cycle and human effects, global warming, examples of sedimentary, metamorphic and Igneous rocks and how they are formed, rock cycle. Explaining the processes of conduction, convection and radiation
Skills	Making and recording observations. Making links between units. Translating information between graphical and numerical form. Understanding simple probability. Construct bar charts and line graphs for appropriate data.	Recognise dependent and independent variables. Use appropriate apparatus and materials during lab work. Make and record observations. Change the subject of an equation and calculating means. Identify risks. Constructing tables.	Calculations of energy costs and resources. Evaluating data about alcohol and nicotine. Social and moral issues, Efficiency calculations for electrical appliances	Interpreting flow charts and diagrams, Substituting into equations and changing the subject of an equation making experimental observations, and measurements using a range of different methods, dealing with misconceptions. Ideas of scale	Changing the subject of an equation, using units appropriately, plotting graphs from experimental data, suggesting improvements to experiments, taking accurate measurements. Consider evidence to support a theory	Selecting appropriate independent, dependent and control variables, analysing and evaluating results. Forming a hypothesis and discussion around environmental issues and differing opinions. Explaining conceptual ideas such as conduction
Key Vocab	pH, indicator, acid, alkali, neutralisation, Balanced unbalanced thrust upthrust, springs, Newtons, kilograms, gravity,	Variation, characteristics, continuous, discontinuous, genetic, environmental waves, frequency, wavelength, velocity, reflection, refraction, dispersion	nutrients, carbohydrates, proteins, starch, iodine, alcohol, nicotine, skeleton, muscles, Benedicts, Biuret, input, output, electrical, chemical, light, sound, thermal, tension,	Earth, seasons, orbit, axis, satellites, moon, gravity, weight conservation, thermal decomposition, combustion, transverse and longitudinal waves, volume, pitch, amplitude, wavelength, frequency	exothermic, endothermic, equations, conservation, decomposition. Gravitational force, distance, speed, velocity, relative motion, evolution, natural selection	exothermic, endothermic, equations, conservation, intensity, control variable, negative correlation, carbon cycle, respiration, climate change, global warming, sedimentary, metamorphic, igneous, porous, cycle. Conduction, convection, radiation

YEAR 9	AUTUMN 1	AUTUMN 2	SPRING 1	SPRING 2	SUMMER 1	SUMMER 2
Chemistry TOPIC	Atomic structure, cells	Chemical Changes / covid recovery	The Periodic table	The Periodic table	Energy Changes	Revision/ review/ covid recovery enrichment
Knowledge	Atomic structure - atoms, elements, compounds and mixtures The development of the model of the atom - plum pudding and nuclear model Relative electrical charges of subatomic particles, size and mass of atoms Relative atomic mass and isotopes Electronic structure	Review of bonding unit and atoms from year 9. Metals react with oxygen to produce metal oxides reactivity series. Knowledge and understanding are limited to the reduction of oxides using carbon/ displacement reactions/	The development of the Periodic table, metals and non metals Group 0 - noble gases Group 1 - Alkali metals Group 7 - Halogens	The development of the Periodic table, metals and non metals Group 0 - noble gases Group 1 - Alkali metals Group 7 - Halogens	Energy transfer during exothermic and endothermic reactions/ Reaction profiles/ The energy change of reactions (HT only) Chemical cells and fuel cells (chemistry only) Fuel cells	Paper 1 topics Atomic structure and the Periodic table Bonding Quantitative Chemistry Chemical changes Energy changes Electrolysis
Skills	Safe use of a range of equipment to separate chemical mixtures Use SI units and the prefix nano Represent the electronic structures of the first twenty elements	Use these to identify where reduction and oxidation has taken place. Describe how carbon is used to reduce metal oxides. Explain how this takes place in terms of movement of electrons. Write balanced symbol equations/half equations for the displacement of metal oxides	Explain how testing a prediction can support or refute a new scientific idea	Explain how testing a prediction can support or refute a new scientific idea	distinguish between exothermic and endothermic reactions on the basis of the temperature change of the surroundings• evaluate uses and applications of exothermic and endothermic reactions given appropriate information. draw simple reaction profiles (energy level diagrams) for exothermic and endothermic reactions showing the relative energies of reactants and products, the activation energy and the overall energy change, with a curved line to show the energy as the reaction proceeds /use reaction profiles to identify reactions as exothermic or endothermic	Required practical skills Maths skills
Key Vocab	Element, mixture, compound, atom, molecule, proton, neutron, electron, isotope	Oxidation/ oxides/ reductions/ electron/ half equation/ OIL RIG	Periodic table, chemical properties, Mendeleev, element, Noble gases, Alkali metals, Halogens, groups and periods	Periodic table, chemical properties, Mendeleev, element, Noble gases, Alkali metals, Halogens, groups and periods	Exothermic/ endothermic/ reaction profile/ activation energy/ reactnat/	

YEAR 9	AUTUMN 1	AUTUMN 2	SPRING 1	SPRING 2	SUMMER 1	SUMMER 2
Physics TOPIC	<i>Particle model of matter</i>	<i>Particle model of matter</i>	<i>Atomic structure Atoms and nuclear radiation</i>	<i>Atoms and nuclear radiation Particle model of matter</i>	<i>Energy</i>	<i>Energy</i>
Knowledge	Changes of heat and specific latent heat Internal energy Particle motion of gases Pressure, temperature and volume Density of materials Investigate the densities of regular solid objects required practical	Investigate the densities of irregular solid objects required practical Forms of energy	The structure of an atom Mass number, atomic number and isotopes The development of the model of the atom Radioactive decay and nuclear radiation Background radiation and penetrating power Nuclear equations Radioactive half-life Hazards and uses of radiation Contamination and irradiation Nuclear fission	Nuclear fusion Particle model of matter Changes of state Specific heat capacity Calculating the specific heat capacity of certain metals required practical	Potential energy Kinetic energy Work done Energy transfers Understanding power Energy efficiency and dissipation of energy	Revision End of year review Specific heat capacity Investigating insulation required practical Energy resources and supplies
Skills	Perform an experiment to measure the latent heat of fusion of water Use measurements to determine the density of solid objects and liquids	Use measurements to determine the density of solid objects and liquids	Recognise expressions given in standard form Use prefixes and powers of ten for orders of magnitude (eg tera, giga, mega, kilo, centi, milli, micro and nano) To show an understanding of why and describe how scientific methods and theories develop over time	To calculate the energy change involved when the temperature of a material changes Use appropriate apparatus to make and record measurements of mass, time and temperature accurately Use in a safe manner appropriate apparatus to measure energy changes/transfers	Recall and apply the Physics equations Investigate the transfer of energy from a gravitational potential energy store to a kinetic energy store	Recall and apply the Physics equations
Key Vocab	Internal energy, specific latent heat, specific latent heat of fusion, specific latent heat of vaporisation, density, pressure	Energy stores and systems, work done, acceleration	Atoms, nucleus, protons, neutrons, electrons, mass number, atomic number, isotopes, radioactive decay, activity, alpha particle, beta particle, gamma ray, half life, contamination, irradiation, nuclear fission	melt, freeze, boil, evaporate, condense, sublimate, specific heat capacity	Work done, kinetic energy, elastic potential energy, spring constant, extension, gravitational potential energy, gravitational field strength, power	Specific heat capacity

YEAR 9	AUTUMN 1	AUTUMN 2	SPRING 1	SPRING 2	SUMMER 1	SUMMER 2
Biology TOPIC	<i>Cell structure</i>	<i>Cell division</i> <i>Transport in cells</i>	<i>Transport in cells/ Infection & response</i> <i>Organisation</i>	<i>Infection & response</i>	<i>Infection & response</i>	<i>Infection & response</i>
Knowledge	Animal and plant cells Microscopy Magnification calculations Using a light microscope required practical Prokaryotes and Eukaryotes Cell specialisation Cell differentiation	Chromosomes Stem cells Diffusion Osmosis theory	Osmosis required practical Active transport. Pathogens, hygiene, aseptic techniques	Bacterial disease, viral disease, fungal disease & protists	The immune response. Vaccinations & antibiotics	The development of new medicines & how they are tested
Skills	Use prefixes centi, milli, micro and nano Recognise, draw and interpret images of cells Use appropriate apparatus to record length and area Use a microscope to make observations of biological specimens and produce labelled scientific drawings	Use models and analogies to develop explanations of how cells divide Evaluate the practical risks and benefits, as well as social and ethical issues, of the use of stem cells in medical research and treatments Recognise, draw and interpret diagrams that model diffusion and osmosis	Use appropriate apparatus to record mass and time Use appropriate apparatus and techniques to observe and measure the process of osmosis Measure the rate of osmosis by water uptake Practice aseptic techniques	Explain how bacteria, viruses, fungi and protists cause disease. Suggest ways to prevent diseases	Explain and evaluate vaccination as a method to prevent disease. Describe how antibiotics can be used to treat bacterial disease	Evaluate clinical trials, analyse data to show effectiveness of medicines
Key Vocab	Cell membrane, cytoplasm, nucleus mitochondria, ribosomes, chloroplasts, specialised cells, microscopy, magnification, resolution, eukaryotes and prokaryotes	Chromosomes, DNA, cell division, stem cells, diffusion, osmosis	Active transport, cells, pathogens, hygiene, aseptic techniques	bacteria, salmonella, gonorrhoea, measles, HIV, malaria, virus, protist	vaccination, antibiotic, antibody, antitoxin, penicillin	Aspirin, digitalis, efficacy, side effects, dosage