Year 8 Science Curriculum Rationale

Here at Caroline Chisholm, the Science department aims to pass on a passion for science to the students. Throughout the course students will be encouraged to use metacognition to begin to develop skills that will allow them to adapt and contribute to in an ever-changing world. Their new theoretical knowledge will promote an intellectual curiosity, playfulness, confidence and passion for science and the wider community.

Within the science curriculum there are many engaging practical activities in lessons along with extracurricular opportunities throughout the year. Students study biology, chemistry and physics throughout the year focusing on the basic core principles that will be built on in the years to come. Pupils are encouraged to be open-minded and to not be afraid of getting things wrong- using their new and developing skills allowing them to persevere and ultimately succeed whilst having some fun.

Unit	Core knowledge/skill development	Sequence	Assessment	Literacy, numeracy, PSHE, FBV, other links	ACP and VAA development	Home learning and enrichment
Plants and their reproduction	This unit covers the following statements from the UK National Curriculum for Science (2013) Reproduction in plants, including: *Flower structure, wind and insect pollination, fertilisation, seed and fruit formation and dispersal,* Quantitative investigation of some dispersal mechanisms	Classification and biodiversity Types of reproduction Pollination Fertilisation and dispersion Germination	General assessment common across all topics/year Summative assessments throughout each topic (e.g hinge questions, multiple-choice, true-or-false, vocabulary matching, cloze activities and short-answer questions in lesson (written, digital and/or verbal).	HSW- Risk assessing a practical, correct use of scientific diagrams, safe working with Bunsen burners etc Literacy- correct names of scientific equipment	Automaticity Automatically adhering to safety rules Risk-taking work in interesting but unfamiliar contexts and show confidence in a science laboratory when doing experiments	Common across all topics/year: Quizzes set on Seneca 30min per week relating to taught content. Use of key web-based resources to enrich and enhance learning e.g. Century Tech, Seneca Learning, Educake, Active Learn etc. Entry to competitions as they arise. STEM fair - spring term.
The periodic table	This unit covers the following statements from the UK National	Dalton's atomic model		HSW- use appropriate techniques,	Imagination Interconnecting prior ks1/2 science knowledge	

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	Curriculum for Science (2013) The varying physical and chemical properties of different elements The principles underpinning the Mendeleev periodic table The periodic table: periods and groups; metals and non-metals How patterns in reactions can be predicted with reference to the periodic table The properties of metals and non-metals The chemical properties of metal	Chemical properties Mendeleev's table Physical trends Chemical trends	Use of web-based applications to assess knowledge in lesson (e.g. Century Tech, Seneca Learning, Educake, Active Learn etc.) Summary block tests 3 per year including theory, skills, and practical assessment. End of year exam.	apparatus, and materials during fieldwork and laboratory work, paying attention to health and safety (using a light microscope and preparing light microscope slides) Maths- use symbols for units. Literacy- Conventions in scientific writing	and relate to current learning. Practice to practice key factors relating to practical work which is then linked to GCSE core work.	Quizzes set on Century tech 30min per week relating to taught content

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	and non-metal oxides with respect to acidity					
Energy transfers	This unit covers the following statements from the UK National Curriculum for Science (2013) Comparing power ratings of appliances in watts (W, kW) Comparing amounts of energy transferred (J, kJ, kW hour) Domestic fuel bills, fuel use and costs	Temperature changes Transferring energy Controlling transfers Power and efficiency Paying for energy		HSW/Maths - using ratios to compare experimental results. Calculate efficiency Literacy - summarising texts. HSW - Energy specific 'language'	Big picture thinking To work with the big idea linked to energy (The total amount of energy in the universe is always the same but can be transferred from one energy store to another during an event) Perseverance To face the difficulties in this unit (especially dealing with concept and maths) and not give up.	
Combustion	This unit covers the following statements from the UK National Curriculum for Science (2013): Combustion is a type of oxidation reaction	Burning fuels Oxidation Fire safety Air pollution Global warming		HSW - understand that scientific hypotheses, methods and theories develop as earlier explanations are modified to take account of new	Meta-cognition use of different thinking approaches and transfer knowledge of particles from one circumstance (e.g. linking properties of a liquid like flow to the organisation of the particles through the use of a model).	

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	Exothermic and endothermic chemical reactions (qualitative)			evidence and ideas, together with the importance of publishing results and peer review make predictions using scientific knowledge and understanding present observations and data using appropriate methods, including tables and graphs. Literacy - how scientists use language to measure and compare by applying adjectives, comparatives, and superlatives.	Creative and enterprising Being creative with thinking to allow learning of conceptual theories that we can't see. Use new knowledge to explain concepts.	

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				Maths - converting between metres and nanometres calculating volumes using simple formulae		
Breathing and respiration	This unit covers the following statements from the UK National Curriculum for Science (2013): Breathing in humans, including adaptations to function The mechanism of breathing to move air in and out of the lungs, using a pressure model to explain the movement of gases, including simple measurements of lung volume	Aerobic respiration Gas exchange system Getting oxygen Comparing gas exchange Anaerobic respiration		Literacy - Information can be presented in different ways to communicate scientific ideas clearly. This includes understanding sentence construction to develop sentences that can be used as part of a fluid writing style that communicates information clearly HSW - understand that	Intellectual confidence To communicate personal views based on evidence when discussing links to issues in health and choices people make Confident deal with new challenges and situations when discussing issues that maybe familiar to them such as a specific health problem.	

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	The impact of exercise, asthma and smoking on the human gas exchange system			scientific methods and theories develop as earlier explanations are modified to take account of new evidence and ideas, together with the importance of publishing results and peer review. 7Cb- Ask questions and develop a line of enquiry based on observations of the real world, alongside prior knowledge, and experience		
Metals and their uses	This unit covers the following statements from the UK National Curriculum for Science (2013):	Metals properties Corrosion Metals and water		HSW - the need for using standard units of measurement (including the SI	Precision to work effectively within the rules of a domain (specific rules linked to forces)	

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	The periodic table: periods and groups; metals and non-metals How patterns in reactions can be predicted with reference to the periodic table the properties of metals and non-metals the chemical properties of metal and non-metal oxides with respect to acidity	Metals and acids Pure metals and alloys		system, its basic units and prefixes). Literacy - the use of conventions when communicating science taking notes from presentations and videos (including the ordering of notes). Maths - the use of conventions when communicating science, the SI system	Collaborative Working in teams throughout the practical work in this unit	
Unicellular organisms	This unit covers the following statements from the UK National Curriculum for Science (2013):	Unicellular or multicellular Microscopic fungi Bacteria		HSW - present observations and data using appropriate methods, including tables and graphs	Generalisation to see how knowledge of particles could be extrapolated to other similar situations	

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	The role of diffusion in the movement of materials in and between cells The structural adaptations of some unicellular organisms	Protoctists Decomposers and carbon		understand and use SI units and IUPAC (International Union of Pure and Applied Chemistry) chemical nomenclature. **Literacy -** the use of facts and opinions to inform and persuade. **Maths -** qualitative and quantitative data the use of: tables; line graphs; scatter graphs; pie charts; and bar charts.	**Enquiring** challenge assumptions/ concepts and seek evidence for the laws of conservation of mass	
Acids and Alkalis	This unit covers the following statements from the UK National Curriculum for Science (2013):	Hazards Indicators Acidity and alkalinity		**HSW -** Evaluate risks. **Literacy -** identify nouns and noun	**Complex and multi-step problem solving** to break down a task (e.g., equations), decide	

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	Chemical reactions as the rearrangement of atoms Representing chemical reactions using formulae and using equations Defining acids and alkalis in terms of neutralisation reactions the pH scale for measuring acidity/alkalinity; and indicators Reactions of acids with alkalis to produce a salt plus water.	Neutralisation Neutralisation in daily life		phrases identify key points in text, pictures, charts and graphs to create titles develop titles for text, diagrams, charts and graphs in order to present ideas and opinions clearly. Maths - reading and plotting line graphs drawing bar charts	on a suitable approach, and then act. Risk-taking Being brave enough to have a go at the difficult tasks such as writing equations, .	
Sound	This unit covers the following statements from the UK National Curriculum for Science (2013):			HSW - present observations and data using appropriate methods, including tables and graphs	Evolutionary and revolutionary thinking to create new ideas through building on existing ideas linked to waves (e.g water waves, earthquakes etc) and	

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	Waves on water as undulations which travel through water with transverse motion; these waves can be reflected and add or cancel – superposition. Frequencies of sound waves, measured in hertz (Hz); echoes, reflection and absorption of sound Sound needs a medium to travel, the speed of sound in air, in water, in solids Sound produced by vibrations of objects, in loudspeakers, detected by their effects on microphone diaphragm and the ear drum			interpret observations and data, including identifying patterns and using observations, measurements and data to draw conclusions Literacy - ways of recalling information. Maths - presenting data graphically.	sound (their own voice box for example). Risk-taking to demonstrate confidence in talking about the light waves (KS2) and sound waves – similarities and differences.	

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	Sound waves are longitudinal Auditory range of humans and animals					
Rocks	This unit covers the following statements from the UK National Curriculum for Science (2013): The composition of the Earth The structure of the Earth the rock cycle and the formation of igneous, sedimentary and metamorphic rocks	Rocks and their uses Igneous and metamorphic Weathering and erosion Sedimentary rocks Materials in the earth		HSW - using physical models to help to explain phenomena explaining why models are used planning a fair test. Literacy - presenting information in tables classifying data as qualitative or quantitative. Maths - the use of symbols when communicating science	Connection finding to use connections from past experiences (KS2 electrical circuits). Speed and accuracy to work at speed to complete the tasks in building circuits plus being able to draw the appropriate scientific diagram using the correct symbols in an acceptable manner (e.g. pencil, ruler, lines not going through components etc).	
Light	This unit covers the following statements from the UK National	Light on the move Reflection		HSW - present observations and data using appropriate	Seeing alternative perspectives to take on the views of others and deal with	

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	Curriculum for Science (2013): The similarities and differences between light waves and waves in matter Light waves travelling through a vacuum; speed of light The transmission of light through materials: absorption, diffuse scattering and specular reflection at a surface Use of ray model to explain imaging in mirrors, the pinhole camera, the refraction of light and action of convex lens in focusing (qualitative); the human eye	Refraction Cameras and eyes Colour		methods, including tables and graphs interpret observations and data, including identifying patterns and using observations, measurements and data to draw conclusions Literacy- information can be presented in different ways to communicate scientific ideas clearly. This includes understanding paragraph construction to develop logical and fluid text that communicates	complexity and ambiguity especially discussing current affairs like COP27, climate change news etc. Flexible Thinking to abandon one idea for a superior one or generate multiple solutions – more than one way to transfer energy	

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	Light transferring energy from source to absorber, leading to chemical and electrical effects; photosensitive material in the retina and in cameras Colours and the different frequencies of light, white light and prisms (qualitative only); Differential colour effects in absorption and diffuse reflection			information clearly. Maths - data can be presented in bar charts data can be presented in scatter graphs data can be presented in frequency diagrams		
Genetics and evolution	This unit covers the following statements from the UK National Curriculum for Science (2013): Heredity as the process by which genetic information is transmitted from one	Environmental variation Inherited variation DNA Genes and extinction Natural selection		HSW - use appropriate techniques, apparatus, and materials during fieldwork and laboratory work, paying attention to health and safety.	Self-regulation to monitor, evaluate and self-correct as this topic builds on the particles units completed earlier in the year. Fluent thinking to generate ideas as pupils have enough	

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	generation to the next A simple model of chromosomes, genes and DNA in heredity, including the part played by Watson, Crick, Wilkins and Franklin in the development of the DNA model Differences between species the variation between individuals within a species being continuous or discontinuous, to include measurement and graphical representation of variation The variation between species and between individuals of the same species			Literacy - Use flow charts to present sequences. Appreciate that the way in which scientific ideas are presented is determined by the purpose and format of the communication. Use conventions and symbols when communicating science.	knowledge to be really creative	

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	meaning some organisms compete more successfully, which can drive natural selection					
Fluids	This unit covers the following statement from the UK National Curriculum for Science (2013): Atmospheric pressure, decreases with increase of height as weight of air above decreases with height Pressure in liquids, increasing with depth; upthrust effects, floating and sinking Pressure measured by ratio of force over area – acting normal to any surface	The particle model Changing state Pressure in fluids Floating and sinking Drag		HSW- understand that scientific methods and theories develop as earlier explanations are modified to take account of new evidence and ideas, together with the importance of publishing results and peer review ask questions and develop a line of enquiry based on observations of the real world, alongside prior	Generalisation to see how what is happening in this instance could be extrapolated to other similar situations as sexual reproduction isn't limited to humans. Resilience remain confident, focused, flexible and optimistic as this is often a topic pupils find hard to discuss in writing or verbally.	

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				knowledge, and experience. Make predictions using scientific knowledge and understanding. Select, plan and carry out the most appropriate types of scientific enquiries to test predictions, including identifying independent, dependent and control variables, where appropriate. Literacy - making effective notes from text, including different ways of organising notes depending on purpose.		

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				Maths - an understanding of number, size and scale and the quantitative relationship between units. Using estimations and explaining when they should be used.		
Making materials	Properties of ceramics, polymers and composites (qualitative)	About ceramics Polymers Composite materials Problems with materials Recycling materials		**Literacy -** making effective notes from text, including different ways of organising notes **depending on purpose.**		