

Year 7 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
Introduction to science	Basic health and safety in the laboratory, core skills (methods, diagrams, names of equipment etc).	<ol style="list-style-type: none"> 1. Health and Safety 2. Finding your way around the laboratory (equipment) 3. Using a Bunsen burner 4. Using a microscope 5. Fun/simple experiments to practice skills 	<p>General assessment common across all topics/year</p> <p>Baseline assessments in week 3.</p> <p>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).</p>	<p>HSW- Risk assessing a practical, correct use of scientific diagrams, safe working with Bunsen burners etc</p> <p>Literacy- correct names of scientific equipment</p>	<p>Automaticity Automatically adhering to safety rules</p> <p>Risk-taking work in interesting but unfamiliar contexts and show confidence in a science laboratory when doing experiments</p>	<p>Common across all topics/year:</p> <p>Quizzes set on Century tech 30min per week relating to taught content.</p> <p>Use of key web-based resources to enrich and enhance learning e.g. Century Tech, Seneca Learning, Educake, Active Learn etc.</p> <p>Entry to competitions as they arise.</p> <p>STEM fair - spring term.</p>
7A - Cells, tissues, organs and systems	<p>This unit covers the following statements from the UK National Curriculum for Science (2013)</p> <ul style="list-style-type: none"> • Cells as the fundamental unit of living 	<p>7Aa Life processes</p> <p>7Ab Organs</p> <p>7Ac Tissues</p> <p>7Ad Cells</p> <p>7Ae Organ systems</p>		<p>HSW- use appropriate techniques, apparatus, and materials during fieldwork and laboratory work, paying attention to health and safety</p>	<p>Imagination Interconnecting prior ks1/2 science knowledge and relate to current learning.</p> <p>Practice</p>	

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	organisms, including how to observe, interpret and record cell structure using a light microscope <ul style="list-style-type: none"> The functions of the cell wall, cell membrane, cytoplasm, nucleus, vacuole, mitochondria and chloroplasts The similarities and differences between plant and animal cells The hierarchical organisation of multicellular organisms: from cells to tissues to organs to systems to organisms. 		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.	(using a light microscope and preparing light microscope slides) Maths- use symbols for units. Literacy- Conventions in scientific writing	to practice key factors relating to practical work which is then linked to GCSE core work.	After school clubs for robotics. Quizzes set on Century tech 30min per week relating to taught content
7I Energy	This unit covers the following statements from the UK National	7Ia Energy from food 7Ib Energy transfers and stores		HSW/Maths - using ratios to compare experimental results. Calculate efficiency	Big picture thinking To work with the big idea linked to energy (The total amount of	

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	Curriculum for Science (2013): <ul style="list-style-type: none"> Comparing energy values of different foods (from labels) (kj) comparing amounts of energy transferred (J, kj, kw hour) fuels and energy resources other processes that involve energy transfer: changing motion, dropping an object, completing an electrical circuit, stretching a spring, metabolism of food, burning fuels energy as a quantity that can be quantified and calculated; the total energy has 	7Ic Fuels 7Id Other energy resources 7Ie Using resources		Literacy - summarising texts. HSW - Energy specific 'language'	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.	

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	the same value before and after a change.					
7G Particles	<p>This unit covers the following statements from the UK National Curriculum for Science (2013):</p> <ul style="list-style-type: none"> The properties of the different states of matter (solid, liquid and gas) in terms of the particle model, including gas pressure (Chemistry) Similarities and differences, between solids, liquids and gases (Physics) Brownian motion in gases (Physics) Differences in arrangements, in motion and in closeness of particles. (Physics) 	<p>7Ga Solids, liquids and gases</p> <p>7Gb Particles</p> <p>7Gc Brownian motion</p> <p>7Gd Diffusion</p> <p>7Ge Air pressure/Waste</p>		<p>HSW - understand that scientific hypotheses, 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 make predictions using scientific knowledge and understanding present observations and data using appropriate methods, including tables and graphs.</p> <p>Literacy - how scientists use language to measure and compare by</p>	<p>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).</p> <p>Creative and enterprising Being creative with thinking to allow learning of conceptual theories that we can't see. Use new knowledge to explain concepts.</p>	

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				<p>applying adjectives, comparatives, and superlatives.</p> <p>Maths - converting between metres and nanometres calculating volumes using simple formulae</p>		
7C- Muscles and bones	<p>This unit covers the following statements from the UK National Curriculum for Science (2013):</p> <ul style="list-style-type: none"> The structure and functions of the gas exchange system in humans. The mechanism of breathing to move air in and out of the lungs including simple measurements of lung volume. The structure and functions of the human skeleton, 	<p>7Ca Muscles, fitness and breathing</p> <p>7Cb Muscles and blood</p> <p>7Cc The skeleton</p> <p>7Cd Muscles and moving</p> <p>7Ce Drugs and sport</p>		<p>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</p> <p>HSW - understand that scientific methods and</p>	<p>Intellectual confidence To communicate personal views based on evidence when discussing links to issues in health and choices people make</p> <p>Confident deal with new challenges and situations when discussing issues that maybe familiar to them such as a specific health problem.</p>	

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	<p>to include support, protection, movement and making blood cells.</p> <ul style="list-style-type: none"> • Biomechanics – the interaction between skeleton and muscles, including the measurement of force exerted by different muscles • The function of muscles and examples of antagonistic muscles • The impact of exercise on the human gas exchange system • The effects of recreational drugs (including substance misuse) on behaviour, health 			<p>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.</p> <p>7Cb- Ask questions and develop a line of enquiry based on observations of the real world, alongside prior knowledge, and experience</p>		

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	and life processes					
7K Forces	<p>This unit covers the following statements from the UK National Curriculum for Science (2013):</p> <ul style="list-style-type: none"> forces as pushes or pulls, arising from the interaction between two objects using force arrows in diagrams, adding forces in one dimension, balanced and unbalanced forces Forces: associated with deforming objects; stretching and squashing – springs; with rubbing and friction between surfaces, with 	<p>7Ka Forces/Different forces (incl. weight and mass)</p> <p>7Kb Springs</p> <p>7Kc Friction</p> <p>7Kd Pressure</p> <p>7Ke Balanced and unbalanced</p>		<p>HSW - the need for using standard units of measurement (including the SI system, its basic units and prefixes).</p> <p>Literacy - the use of conventions when communicating science taking notes from presentations and videos (including the ordering of notes).</p> <p>Maths - the use of conventions when communicating science, the SI system</p>	<p>Precision to work effectively within the rules of a domain (specific rules linked to forces)</p> <p>Collaborative Working in teams throughout the practical work in this unit</p>	

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	<p>pushing things out of the way; resistance to motion of air and water (briefly)</p> <ul style="list-style-type: none"> Forces measured in newtons, Measurements of stretch or compression as force is changed force–extension linear relation; Hooke’s Law As a special case pressure measured by ratio of force over area – acting normal to any surface Opposing forces and equilibrium: weight held by stretched spring or supported on a compressed surface forces being needed to cause objects to 					

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	stop or start moving, or to change their speed or direction of motion change depending on direction of force and its size					

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7H Atoms and elements	<p>This unit covers the following statements from the UK National Curriculum for Science (2013):</p> <ul style="list-style-type: none"> The concept of a pure substance mixtures, including dissolving Differences between atoms, elements and compounds Chemical symbols and formulae for elements and compounds Combustion, thermal decomposition, oxidation and displacement reactions The varying physical and chemical properties of 	<p>7Ha Sorting resource data/The air we breathe</p> <p>7Hb Earth's elements</p> <p>7Hc Metals and non-metals</p> <p>7Hd Making compounds</p> <p>7He Chemical reactions/ Problems with elements</p>		<p>HSW - present observations and data using appropriate methods, including tables and graphs understand and use SI units and IUPAC (International Union of Pure and Applied Chemistry) chemical nomenclature.</p> <p>Literacy - the use of facts and opinions to inform and persuade.</p> <p>Maths - qualitative and quantitative data the use of: tables; line graphs; scatter graphs; pie charts; and bar charts.</p>	<p>Generalisation to see how knowledge of particles could be extrapolated to other similar situations</p> <p>Enquiring challenge assumptions/ concepts and seek evidence for the laws of conservation of mass</p>	

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	<p>different elements</p> <ul style="list-style-type: none"> The composition of the Earth The difference between chemical and physical changes (physics) Atoms and molecules as particles (physics). 					
7D Ecosystems	This unit covers the following statements from the UK National Curriculum for Science (2013):	<p>7Da Variation</p> <p>7Db Adaptations</p>		<p>HSW - present observations and data using appropriate methods, including</p>	<p>Seeing alternative perspectives to take on the views of others and deal with complexity and</p>	

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	<ul style="list-style-type: none"> The interdependence of organisms in an ecosystem, including food webs and insect pollinated crops How organisms affect, and are affected by, their environment, including the accumulation of toxic materials 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 	<p>7Dc Effects of the environment</p> <p>7Dd Effects on the environment</p> <p>7De Transfers in food chains</p>		<p>tables and graphs interpret observations and data, including identifying patterns and using observations, measurements and data to draw conclusions</p> <p>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 information clearly.</p> <p>Maths - data can be presented in bar charts data can be presented in scatter graphs data can be</p>	<p>ambiguity especially discussing current affairs like COP27, climate change news etc.</p> <p>Flexible Thinking to abandon one idea for a superior one or generate multiple solutions – more than one way to transfer energy</p>	

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	<p>individuals of the same species means some organisms compete more successfully, which can drive natural selection</p> <ul style="list-style-type: none"> The importance of maintaining biodiversity and the use of gene banks to preserve hereditary material 			presented in frequency diagrams		
7E Mixtures and Separations	<p>This unit covers the following statements from the UK National Curriculum for Science (2013):</p> <ul style="list-style-type: none"> Mixtures, including dissolving simple techniques for separating mixtures: filtration, evaporation, evaporation, 	<p>7Ea Mixtures</p> <p>7Eb Solutions</p> <p>7Ec Evaporation</p> <p>7Ed Chromatography</p> <p>7Ee Distillation</p>		<p>HSW - use appropriate techniques, apparatus, and materials during fieldwork and laboratory work, paying attention to health and safety.</p> <p>Literacy - Use flow charts to present sequences.</p>	<p>Self-regulation</p> <p>to monitor, evaluate and self-correct as this topic builds on the particles units completed earlier in the year.</p> <p>Fluent thinking</p> <p>to generate ideas as pupils have enough knowledge to be really creative</p>	

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	distillation and chromatography.			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.		
7B- Sexual reproduction in animals	<p>This unit covers the following statement from the UK National Curriculum for Science (2013):</p> <ul style="list-style-type: none"> Reproduction in humans (as an example of a mammal), including the structure and function of the male and female reproductive systems, menstrual cycle (without details of hormones), 	<p>7Ba The scientific method</p> <p>7Ba Animal sexual reproduction</p> <p>7Bc Becoming pregnant</p> <p>7Bd Gestation and birth</p> <p>7Be Growing up</p>		<p>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</p>	<p>Generalisation</p> <p>to see how what is happening in this instance could be extrapolated to other similar situations as sexual reproduction isn't limited to humans.</p> <p>Resilience</p> <p>remain confident, focused, flexible and optimistic as this is often a topic pupils find hard to discuss in writing or verbally.</p>	

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	gametes, fertilisation, gestation and birth, to include the effect of maternal lifestyle on the foetus through the placenta.			<p>prior 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.</p> <p>Literacy - making effective notes from text, including different ways of organising notes depending on purpose.</p> <p>Maths - an understanding of number, size and scale and the quantitative</p>		

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				relationship between units. Using estimations and explaining when they should be used.		
8A – food and nutrition	<p>This unit covers the following statement from the UK National Curriculum for Science (2013):</p> <ul style="list-style-type: none"> the content of a healthy human diet: carbohydrates, lipids (fats and oils), proteins, vitamins, minerals, dietary fibre and water, and why each is needed calculations of energy requirements in a healthy daily diet the consequences of imbalances in the diet, including obesity, starvation and deficiency diseases 	<p>8Aa nutrients 8Ab uses of nutrients 8Ac Balanced diets 8Ad digestion 8Ae absorption</p>		<p>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 knowledge, and experience. Make predictions using scientific knowledge and understanding. Select, plan and carry out the most</p>	<p>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.</p> <p>Resilience remain confident, focused, flexible and optimistic as this is often a topic pupils find hard to discuss in writing or verbally.</p>	

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	<ul style="list-style-type: none"> the tissues and organs of the human digestive system, including adaptations to function and how the digestive system digests food (enzymes simply as biological the importance of bacteria in the human digestive system 			<p>appropriate types of scientific enquiries to test predictions, including identifying independent, dependent and control variables, where appropriate.</p> <p>Literacy - making effective notes from text, including different ways of organising notes depending on purpose.</p> <p>Maths - an understanding of number, size and scale and the quantitative relationship between units. Using estimations and explaining when they should be used.</p>		
8L Earth and space	<ul style="list-style-type: none"> gravity force, weight = mass x gravitational field 	8La Gathering the evidence 8Lb Seasons		HSW - understand that scientific methods and	Generalisation to see how what is happening in this	

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	<p>strength (g), on Earth $g=10 \text{ N/kg}$, different on other planets and stars; gravity forces between Earth and Moon, and between Earth and sun (qualitative only)</p> <ul style="list-style-type: none"> our sun as a star, other stars in our galaxy, other galaxies the seasons and the Earth's tilt, day length at different times of year, in different hemispheres the light year as a unit of astronomical distance 	<p>8Lc Magnetic earth 8Ld Gravity in space 8Le Beyond the solar system</p>		<p>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 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.</p>	<p>instance could be extrapolated to other similar situations as sexual reproduction isn't limited to humans.</p> <p>Resilience remain confident, focused, flexible and optimistic as this is often a topic pupils find hard to discuss in writing or verbally.</p>	

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				<p>Literacy - making effective notes from text, including different ways of organising notes depending on purpose.</p> <p>Maths - an understanding of number, size and scale and the quantitative relationship between units. Using estimations and explaining when they should be used.</p>		
7J Current electricity	<ul style="list-style-type: none"> electric current, measured in amperes, in circuits, series and parallel circuits, currents add where branches meet and current as flow of charge 7Ja-7Jd 	7Ja – switches and current 7Jb- models for circuits 7Jc -series and parallel circuits 7Jd-changing the current 7Je-Using electricity.		<p>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</p>	<p>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.</p> <p>Resilience</p>	

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				<p>and peer review ask questions and develop a line of enquiry based on observations of the real world, alongside prior knowledge, and experience.</p> <p>Make predictions using scientific knowledge and understanding.</p> <p>Select, plan and carry out the most appropriate types of scientific enquiries to test predictions, including identifying independent, dependent and control variables, where appropriate.</p> <p>Literacy - making effective notes from text, including different ways of organising notes depending on purpose.</p>	<p>remain confident, focused, flexible and optimistic as this is often a topic pupils find hard to discuss in writing or verbally.</p>	

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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.		