

**St. Sampson High School
Subject Curriculum Overview**

Department	Science		HoD	J Roberts
Intent	<p><i>Science is a set of ideas about the material world. The KS3 and KS4 curriculum includes all the parts of what good science is at the appropriate level: whether it be investigating, observing, experimenting or testing out ideas and thinking about them. The way scientific ideas flow through both courses helps to build a deep understanding of science which involves talking about, reading and writing about science plus the actual doing, as well as representing science in its many forms both mathematically and visually through models.</i></p>			
Big Ideas	<p>HSW Development of scientific thinking, Experimental skills and strategies, Analysis and evaluation, Scientific vocabulary, quantities, units, symbols and nomenclature</p> <p>Biology @ KS4 Cell biology, Organisation, Infection and response, Bioenergetics, Homeostasis and response, Inheritance, variation and evolution Ecology</p> <p>Chemistry @ KS4 Atomic structure and the periodic table Bonding, structure, and the properties of matter, Quantitative chemistry, Chemical changes, Energy changes, The rate and extent of chemical change, Organic chemistry, Chemical analysis, Chemistry of the atmosphere, Using resources</p> <p>Physics @ KS4 Energy, Electricity, Particle model of matter, Atomic structure, Forces, Waves, Magnetism and electromagnetism</p> <p><i>KS3 units feed into these key ideas (see appendix 1, colour coding follows strands through the 5 year programme)</i></p>	Key tier 2 and 3 vocabulary	<p><i>Appendix 2 is a list of Tier 2 and 3 words for each KS3 module.</i></p>	

Enrichment or Opportunities for out of class learning	<i>Field work, extended learning related to the environment,</i>					
Links to Rights Respecting School	<i>Discussions about variation and genetics - Article 2 Ethical questions on pregnancy, contraception etc - Article 12 Subjects studied include health, nutrition, illegal drugs, smoking and alcohol - Article 24</i>					
The key aspects of pupil achievement	Knowledge	<i>What should students know?</i>	Understanding	<i>What should students understand?</i>	Skills	<i>What should students be able to do?</i>
By age 11 students should	Knowledge	There is no published learning outcomes for KS2 science in the Bailiwick. Appendix 3 gives the learning outcomes from the UK National Curriculum. and fits with the 5 Year curriculum model.	Understanding	<i>See appendix 3</i>	Skills	<i>Asking simple questions and recognising that they can be answered in different ways observing closely, using simple equipment performing simple tests identifying and classifying using their observations and ideas to suggest answers to questions gathering and recording data to help in answering questions.</i>
KS3	Year 7		Year 8		Year 9	
Implement Autumn	<u>Skills unit</u> Students should be able to use the key vocabulary effectively and to plan, carry out, analyse and evaluate investigations	Either: B1 Organisms skeleton, muscles, joints, breathing, organisation, cells, smoking, disease, diet C1 Matter Particle model, separating mixtures or P1 Forces Forces, motion,	Either: B3 Organisms Digestion, respiration, plant science C3 Elements and compounds Periodic table, making compounds, chemical and physical changes, polymers P3 Energy Energy stores and pathways, GPE, KPE, Work, Generating electricity, renewable energy, Thermal energy and heat transfer, Levers and moments	Either: B3 Organisms Digestion, respiration, plant science C3 Elements and compounds Periodic table, making compounds, chemical and physical changes, polymers P3 Energy Energy stores and pathways, GPE, KPE, Work, Generating electricity,	For 2020-21 only Rotation of: Chemical reactions Types of chemical reactions Forces Moments, pressure, speed, friction Electricity and magnetism Static electricity, circuits and symbols, magnetic fields, electromagnets Maths Skills for Science module	

		moments, gravity (weight and mass), pressure		renewable energy, Thermal energy and heat transfer, Levers and moments	
Assessment		End of unit tests Required practical in Matter (Chromatography) Required practical in Forces (Falling Objects)	End of unit tests Insulation required practical Required practical: Plastic bags	End of unit tests Insulation required practical Required practical: Plastic bags	End of unit tests Required practical: Current vs length of wire.
Implement Spring	Either: B1 Organisms skeleton, muscles, joints, breathing, organisation, cells, smoking, disease, diet C1 Matter Particle model, separating mixtures or P1 Forces Forces, motion, moments, gravity (weight and mass), pressure	Either: B2 Ecosystems Habitats, feeding relationships (interdependence) Reproduction (including puberty), conception, pregnancy and birth C2 Reactions Metals and non-metals, displacement reactions, oxidation reactions, acids and alkalis, neutralisation, Earth's resources P2 Waves Light, sound, EM spectrum	Either: B3 Organisms Digestion, respiration, plant science C3 Elements and compounds Periodic table, making compounds, chemical and physical changes, polymers P3 Energy Energy stores and pathways, GPE, KPE, Work, Generating electricity, renewable energy, Thermal energy and heat transfer, Levers and moments	Either: B4 Diseases Pathogens, microbiology, hygiene, primary and secondary defences, antibiotics, STIs, variation and inheritance, ethics C4 Reactions Energy changes in reactions, thermal decomposition, conservation of mass, combustion, climate change and carbon footprint, P4 Electromagnets Static electricity, electrical circuits, resistance, magnetic fields, electromagnets	Maths Skills for Science module Either: AQA B1 Cell Biology Types of cell, cell function, microscopy, cell differentiation, cell specialisation, mitosis, cell cycle, transport in cells. AQA C1 Atomic structure and the periodic table Atomic structure, elements, compounds, separating mixtures, development of atomic model, sub-atomic particles, relative atomic mass, electronic structure, development of the periodic table, structure of the periodic table, Groups 1, 7 and 0. AQA P3 Particle model Density, changes of state, internal energy and energy transfers, specific

						heat capacity, latent heat, particle motion in gases.
Assessment	End of unit tests Required practical in Matter (Chromatography) Required practical in Forces (Falling Objects)	End of unit tests	End of unit tests Insulation required practical Required practical: Plastic bags	End of unit tests Required practical: disinfectants	End of unit test	End of unit tests Required practicals: osmosis, density
Implement Summer	Either: B2 Ecosystems Habitats, feeding relationships (interdependence) Reproduction (including puberty), conception, pregnancy and birth C2 Reactions Metals and non-metals, displacement reactions, oxidation reactions, acids and alkalis, neutralisation, Earth's resources P2 Waves Light, sound, EM spectrum	Either: B2 Ecosystems Habitats, feeding relationships (interdependence) Reproduction (including puberty), conception, pregnancy and birth C2 Reactions Metals and non-metals, displacement reactions, oxidation reactions, acids and alkalis, neutralisation, Earth's resources P2 Waves Light, sound, EM spectrum	Either: B4 Diseases Pathogens, microbiology, hygiene, primary and secondary defences, antibiotics, STIs, variation and inheritance, ethics C4 Reactions Energy changes in reactions, thermal decomposition, conservation of mass, combustion, climate change and carbon footprint, P4 Electromagnets Static electricity, electrical circuits, resistance, magnetic fields, electromagnets	Either: B4 Diseases Pathogens, microbiology, hygiene, primary and secondary defences, antibiotics, STIs, variation and inheritance, ethics C4 Reactions Energy changes in reactions, thermal decomposition, conservation of mass, combustion, climate change and carbon footprint, P4 Electromagnets Static electricity, electrical circuits, resistance, magnetic fields, electromagnets	Either: AQA B1 Cell Biology Types of cell, cell function, microscopy, cell differentiation, cell specialisation, mitosis, cell cycle, transport in cells. AQA C1 Atomic structure and the periodic table Atomic structure, elements, compounds, separating mixtures, development of atomic model, sub-atomic particles, relative atomic mass, electronic structure, development of the periodic table, Groups 1, 7 and 0. AQA P3 Particle model Density, changes of state, internal energy and energy transfers, specific state, internal energy and energy transfers,	Either: AQA B1 Cell Biology Types of cell, cell function, microscopy, cell differentiation, cell specialisation, mitosis, cell cycle, transport in cells. AQA C1 Atomic structure and the periodic table Atomic structure, elements, compounds, separating mixtures, development of atomic model, sub-atomic particles, relative atomic mass, electronic structure, development of the periodic table, Groups 1, 7 and 0. AQA P3 Particle model Density, changes of state, internal energy and energy transfers, specific state, internal energy and energy transfers,

					specific heat capacity, latent heat, particle motion in gases.	heat, particle motion in gases.
Assessment	End of unit tests	End of unit tests End of year exam	End of unit tests Required practical: disinfectants	End of unit tests Required practical: disinfectants	End of unit tests Required practicals: osmosis, density	End of unit tests Required practicals: osmosis, density End of year exam
By age 14 students should	Knowledge	Pupils should be able to describe associated processes and key characteristics in common language, but they should also be familiar with, and use, technical terminology accurately and precisely. They should build up an extended specialist vocabulary. They should also apply their mathematical knowledge to their understanding of science, including collecting, presenting and analysing data.	Understanding	The principal focus of science teaching in key stage 3 is to develop a deeper understanding of a range of scientific ideas in the subject disciplines of biology, chemistry and physics. Pupils should begin to see the connections between these subject areas and Science – key stage 3 3 become aware of some of the big ideas underpinning scientific knowledge and understanding.	Skills	<p>Scientific attitudes <i>Pay attention to objectivity and concern for accuracy, precision, repeatability and reproducibility</i> <i>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 evaluate risks.</i></p> <p>Experimental skills and investigations <i>Ask questions based on observations of the real world,</i> <i>Make predictions using scientific knowledge and understanding</i> <i>Select, plan and carry out the most appropriate types of scientific enquiries to test</i></p>

					<p><i>predictions, including identifying independent, dependent and control variables, where appropriate</i></p> <p><i>Use appropriate techniques, apparatus, and materials during fieldwork and laboratory work, paying attention to health and safety</i></p> <p><i>Make and record observations and measurements using a range of methods for different investigations</i></p> <p><i>Evaluate the reliability of methods and suggest possible improvements</i></p> <p><i>apply sampling techniques.</i></p> <p>Analysis and evaluation</p> <p><i>Apply mathematical concepts and calculate results</i></p> <p><i>Present observations and data using appropriate methods, including tables and graphs</i></p> <p><i>Interpret observations and data, including identifying patterns</i></p> <p><i>Using observations, measurements and data to</i></p>
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						<p><i>draw conclusions present reasoned explanations, including explaining data in relation to predictions and hypotheses</i></p> <p><i>Evaluate data, showing awareness of potential sources of random and systematic error</i></p> <p><i>Identify further questions arising from their results.</i></p> <p>Measurement</p> <p><i>Understand and use SI units and IUPAC (International Union of Pure and Applied Chemistry) chemical nomenclature</i></p> <p><i>Use and derive simple equations and carry out appropriate calculations</i></p> <p><i>Undertake basic data analysis including simple statistical techniques.</i></p>
	<p>Modules are shared between 2 or 3 teachers so the teaching order varies according to teams of subject specialists.</p>			<p>Modules are shared between 2 or 3 teachers so the teaching order varies according to teams of subject specialists.</p>		
KS4	Year 10			Year 11		
<p>Implement</p> <p>Autumn</p>	<p>B2 Organisation</p> <p>Specialised cells</p> <p>Tissue</p> <p>Organ</p> <p>Organ system</p> <p>Enzymes - denaturing</p>	<p>C2 Structure and bonding</p> <p>States (S/L/G)</p> <p>Changes of state</p> <p>Ions</p> <p>Ionic bonding</p> <p>Ionic compounds</p>	<p>B5 Homeostasis</p> <p>Thermoregulation</p> <p>Nervous system</p> <p>Neurons / CNS</p> <p>Reflex arc – synapses</p> <p>Reaction times</p>	<p>C6 Rate and extent of chemical reactions</p> <p>Factors affecting</p> <p>Collision theory</p> <p>Temp/conc/S.A</p> <p>Catalysts</p>		

	Lock & key model Digestive organs Bile Heart, blood, vessels Gas exchange lungs Cardiovascular diseases Statins, transplants Health & disease Risk factors Cancer Xylem phloem Transpiration Translocation Stomata	Properties of ionic Covalent bonding Dot and cross Simple molecules Giant molecules Diamond Graphite Graphene Metallic bonding Alloys, conductor Polymers P2 Electricity Symbols Circuit Diagrams Series Parallel Current Voltage (P.D) Charge Resistance Ohms Law Resistors Power $P = I V$ Plugs AC/DC Appliances $P = E / T$ Efficiency National grid Transformers	Endocrine system Glands release Hormones Controlling blood glucose Diabetes type 1 & 2 Thyroxine & Adrenaline Negative feedback Menstrual cycle (LH FSH) Controlling fertility Urinary System Kidney Failure B6 Inheritance, variation and evolution Reproduction (a/sexual) Fertilisation Meiosis & Mitosis Chromosomes XX/XY Genetic inheritance/diseases Punnet square Genotype/Phenotype Homo/Hetrozygous Genetic engineering Variation Selective breeding Classification 3 - Domain system Evolution Natural selection/ Darwin Extinction/Fossils Antibiotic resistant bacteria DNA	Measuring rate of reaction Reversible reaction Equilibrium Closed system Le Chatelier factors Conc/temp/pressure C7 Organic Chemistry Crude oil Hydrocarbons Alkenes Alkanes Fractional distillation Viscosity Uses Cracking Combustion C8 Analysis Purity Impure Formulation Chromatography Rf Value Mobile phase Testing for O_2 CO_2 H_2 Cl_2
Assessment	End of unit test (exampro) Required practical write-up	End of unit test (exampro) Required practical write-up	End of unit test (exampro) Required practical write-up	End of unit test (exampro) Required practical write-up

<p style="text-align: center;">Implement Spring</p>	<p>B3 Infection and response Communicable diseases Pathogens Virus Fungi Protist Bacteria Physical/chemical defences Immune system Antibodies Antibiotics Vaccines Drug development/trials C3 Quantitative Chemistry Conservation of mass Equations Relative formula mass Moles Concentration Limiting factors</p>	<p>P3 Particle Model Particle Model States - S/L/G Changes of state Chemical/physical changes Density Specific heat capacity Specific latent heat Gas Pressure Kinetic energy C4 Chemical Change Reactivity series Displacement OIL RIG Metals + acids pH scale Neutralisation Acids Bases Strong weak acids Extracting metals Electrolysis Redox reactions Aqueous solution</p>	<p>B7 Ecology Ecosystem Abiotic Biotic factors Adaptations Competition Food chains –producer/consumer Quadrats Biodiversity Deforestation Waste management Pesticides Water cycle Carbon cycle Land use Global warming Greenhouse effect P6 Waves Transverse & longitudinal Frequency Wavelength Amplitude Period Wave speed Refraction Electromagnetic spectrum Uses and dangers Oscillations</p>	<p>C9 The atmosphere Composition of earth % of gases Early atmosphere Photosynthesis Respiration Greenhouse effect Greenhouse gases Climate change Causes effects Carbon footprint Pollution Acid rain C10 Finite resources Fossil fuels Renewable resources Recycling Potable water Water treatment Filtration Sterilisation Life cycle assessment Recycling</p>
<p style="text-align: center;">Assessment</p>	<p>End of unit test (exampro) Required practical write-up</p>	<p>End of unit test (exampro) Required practical write-up</p>	<p>End of unit test (exampro) Required practical write-up</p>	<p>End of unit test (exampro) Required practical write-up</p>

Implement Summer	B4 Bioenergetics Photosynthesis Limiting factors Uses of glucose Respiration Aerobic Anaerobic Lactic acid Yeast cells Exercise & effects Metabolism	P4 Atomic Structure Atom (P.E.N) Isotopes Developing the model of the atom Plum pudding Rutherford Radiation Decay Alpha, Beta, Gamma Half life Radioactive contamination C5 Energy changes Exothermic Endothermic Reaction profiles Catalysts Activation energy Bond energy	P5 Forces Scalar & Vectors Contact/non-contact Free Body Diagrams Weight, mass & gravity Resultant forces Work done Elasticity Spring constant & Hooks Law Displacement Speed / Velocity Distance/time graphs Acceleration Terminal velocity Newtons Laws Inertia Momentum Stopping distances Reaction times Crash zones	P7 Magnets and electromagnets Poles Attract repel Permanent/induced magnets Magnetic fields & plotting Motor effect Electromagnets Solenoids Flemings left hand rule Motor effect		
	Assessment	End of unit test (exampro) Required practical write-up	End of unit test (exampro) Required practical write-up End of year 10 exam	End of unit test (exampro) Required practical write-up Mock exam	End of unit test (exampro) Required practical write-up	
By age 16 students should	Knowledge	See AQA specification	Understanding	See AQA specification	Skills	See AQA specification