Subject: Science

Intent –KS3	Implementation –KS3	Impact –KS3
Our main aim is to capture student's curiosity of the world around them and provide them with the skills they need to explore and understand it. We want students at Dene Magna to be able to have a well thought out opinion about what is going on in the world. It is our hope that many students, regardless of gender or socioeconomic status, will want to pursue science at post 16, to become scientists of the future. In order to make this happen we believe students should enjoy lessons that are well planned by teachers with expert knowledge. Our KS3 intent is to ensure students have a solid foundation of knowledge that is free from misconceptions. As such, our engaging curriculum is centred around developing thinking, investigative and practical skills that will allow them to reach their maximum potential at GCSE. We intend to close the gap in attainment between pp and non-pp students	Our SOLs spiral around the key concepts in science, gradually increasing in complexity. Students are taught in mixed ability classes. We challenge students through Q&A and give them opportunities to respond to feedback Each topic has a core practical and several recommended practical activities to ensure experiments and demonstration are central to teaching. We use BEST resources throughout our SoL. These are used to understand student's pre & misconceptions to inform our planning and teaching Each topic uses misconception sheets and progress questions to inform planning and teaching The department is split into a Head of department and three Lead Teachers; Physics, Biology and Chemistry. These are responsible for SoL development and delivering bi-weekly cpd sessions to non-specialists. Ongoing coaching conversations to develop teaching and learning. Action research into engaging ILT that is accessible to all. We use retrieval at the beginning of every lesson to ensure that content gets into students long term memory. Students have knowledge organisers and glossaries to help them to understand and use keywords. These are referred to in lessons. Students are invited to a lunchtime science club and ILT club	Students will develop a solid foundation in science on which to build at KS4. As we do not set in science students are given time to develop their key skills before deciding at the end of year 9 whether triple science is right for them. This is over subscribed. Students enjoy doing experiments. By the end of KS3 they have developed a love of the subject and a thorough understanding of the practical, thinking and investigative skills needed to access GCSE questions. Students develop their subject specific vocabulary in order to access KS4 texts. Progress is assessed through end of topic tests, two written assessments and teacher assessment.

Intent –KS4	Implementation –KS4	Impact –KS4
We offer an ambitious curriculum for all students, we want students to be aspirational to develop a secure; Scientific knowledge and conceptual understanding of Biology, Chemistry and Physics Understanding of the nature, processes and methods of science, through different types of scientific enquiries that help them to answer scientific questions about the world around them Observational, practical, modelling, enquiry and problem-solving skills in the laboratory, in the field and in other learning environments Ability to evaluate claims based on science through critical analysis of the methodology, evidence and conclusions, both qualitatively and quantitatively. We intend for students to enjoy science so that they want to undertake further studies with us in science, regardless of gender or socioeconomic status. We realise many students have missed out on learning due to Covid, we aim to reduce the impact of this. We intend for students to have the language and skills necessary to access GCSE texts and answer GCSE questions. We intend to close the gap between pp and non-pp students	The Combined Science groups are taught in mixed ability groups. We also offer the Entry Level Certificate, which allows students with low attainment at KS3 an easier transition to KS4. We offer challenge in year 10 to students wanting to follow the Separate Science route. All teachers maintain Google classrooms, where work for lessons, ILT, revision aids, videos and past papers are posted to support those missing lessons and in preparation for their examinations. We use retrieval in all our lessons. We link year 10 and 11 content to ensure that there are no gaps in understanding that may prevent learning. We offer period 6 science once a fortnight. We have intervention tutors that work with students to bridge gaps in knowledge. We run FameLab where students have the opportunity to present an area of their scientific interest on a national platform. Students have knowledge organisers and glossaries that are referred to and used in lesson. We have bi-weekly cpd to ensure all teachers have excellent pedagogical content knowledge and teaching. All students have three subject specialist teachers across their nine science lessons. We have a specialist HLTA to support in lessons. All courses are Edexcel, which was selected due to the breadth of its resources and the balance of the topics covered.	We aim for students to reach their aspirational target grades and achieve above the national average We have increasing numbers of students staying with us to do A level sciences.

KS5 – Intent	KS5 – Implementation	KS5 - Impact
We offer three Edexcel courses and qualifications: A Level Biology A Level Chemistry A Level Physics We intend all students, regardless of their entry grades develop; ● Essential knowledge and understanding of different areas of each subject and how they relate to each other ● Demonstrate a deep appreciation of the skills, knowledge and understanding of scientific methods ● Competence and confidence in a variety of practical, mathematical and problem solving skills ● Their interest in and enthusiasm for the subject, including developing an interest in further study and careers associated with the subject ● Understanding of how society makes decisions about scientific issues and how the sciences contribute to the success of the economy and society. We want as many girls as boys, pp as non-pp students to pursue STEM subjects at degree level	In all A levels we follow the Edexcel specification, it follows on from GCSE well. The resources and core practical lessons are familiar to Dene Magna staff and students. All teachers are subject specialists, in addition we have experienced Lead Teachers for each subject. These are all members of RSB, RSC and IoP respectively and are in the process of becoming chartered. These teachers support other teachers in A level delivery to ensure high quality teaching and learning. Google Classrooms store lessons, revision materials and online support to ensure students who are isolating do not fall behind. We run field trips; including a biology fields trip to the wilderness centre & a physics trip to CERN We have an experienced technician capable of creating innovative equipment and experiments to support teaching and learning. We hold lunchtime support sessions with an open door policy for all students. We use Dene Magna's teaching and learning policy to ensure students are exam ready.	We have a high number of students pursuing STEM subjects at degree and higher apprenticeship level. Exam success in line with student targets, our first cohort achieved ALPS 2 (Biology and Chemistry) and ALPS 1 (Physics)

		Autumn	Spring	Summer

		Term 1	Term 2	Term 3	Term 4	Term 5	Term 6
Year 7	Knowledge	What is means to be alive [B1] Cells [B1] Diffusion [B1] Reproduction[B7] Puberty* Foetal development*	States of matter & particles[C1] Changes of state[C1] Acids and alkali[C8]	Energy stores & transfers[P3] Temperature[P12] conduction[P3], convection[P3], radiation[P3], insulation[P3] Energy resources[P3]	Photosynthesis[B6] Food chains & webs[B9] Ecosystems[B9] Human nutrition[B1, B7] Drugs[B5]	Atoms[C3] Elements, compounds and mixtures[C2, C5,6,7] Chemical formulae[C4,5,6,7] Solubility[C8] Separation techniques[C2]	Forces[P2] Friction[p2] Speed[P1] Distance/time graphs[P1] Mass & weight[p2] Elasticity & density[P12]
	Skills	Examine specimens using a microscope Use & rearrange equations As below	Set up & use a Bunsen burner. As below	As below	As below	Separate mixtures of substances using appropriate techniques. As below	Use appropriate apparatus to measure & record and explain differences between related measurements As below
	Planning experimental methods – Identify hazards & plan to control risks. Apply sampling techniques. Identify & choose appropriate independent & dependent variables. Identify & plan to control appropriate control variables. **Collecting & recording results** – Make sufficient observations & readings with consideration of an appropriate degree of detail, accuracy & precision, produce labelled diagrams. Use & develop systematic tables in which to record data. **Considering results & drawing conclusions** – Use observations, data and scientific knowledge to draw conclusions. Interpret & plot bar charts and line graphs. Calculate mean. Identify patterns, correlations & linear relationships in data. Identify anomalous results. Use line graphs to estimate values **Evaluating experimental methods & results** – Suggest ways to improve an experiment. Suggest reasons for differences in repeat readings and suggest better ways to control variables.						
	Assessment	B1 assessment 1 & 2 Test	C1 assessment 1 & 2 Test	P1 assessment 1 & 2 Test	B2 assessment 1 & 2 Test	C2 assessment 1 & 2 Test	P2 assessment 1 & 2 Test

Due to timetable constraints year 7 and 8 are on a rolling rota. All students do the 1 topics (B1, C1, P1) first and then the 2 topics. However, the order of the topics therein varies. These topics all provide the foundation skills/knowledge for future topics (in red) Those topics with a * students do not meet again but are included as part of a broad and balanced curriculum

		Autumn		Spring		Summer	
		Term 1	Term 2	Term 3	Term 4	Term 5	Term 6
Year 8	Knowledge	Respiratory system B8 Circulatory system B8 Aerobic respiration B8 Gas exchange in plants B6, B8 Enzymes B1	Atomic structure C3 P6 Periodic table C4 Properties of metals and non-metals C7 Properties of group 1,7,0 C13 Reactivity series C11 Polymers, ceramics and composites Exothermic and endothermic reactions C15 Word equations C8 C9	Waves P4 Sound P4 Ear SB2 Light P5 Reflection P4 Refraction P4 Eye SB2	Classification B4 DNA B3 Variation B3 B4 Inheritance B3 B4 Human genome project B3 Natural selection B4 Extinction B4 B9 Biodiversity B9	Atomic structure C3 P6 Conservation of mass C9 Chemical equations C8 C9 Combustion and fuels C15 P3 Reactions of metals with oxygen C11 Thermal decomposition C11 C15 Acids and alkalis C8 Making and naming salts C8	Static charge P9 Current P9 Potential difference P9 Circuit symbols P9 Resistance P9 Magnetism P10 Electromagnetism P11
	Planning experimental methods – Identify hazards & plan to control risks. Apply sampling techniques. Identify & choose appropriate independent & dependent variables. Identify & plan to control appropriate control variables. **Using apparatus -** use appropriate apparatus consistently to measure and record and explain differences between related measurements. **Collecting & recording results** – Make sufficient observations & readings with consideration of an appropriate degree of detail, accuracy & precision, produce labelled diagrams. Use & develop systematic tables in which to record data. **Considering results & drawing conclusions** – Use observations, data and scientific knowledge to draw conclusions. Interpret & plot bar charts and line graphs. Calculate mean. Identify patterns, correlations & linear relationships in data. Identify anomalous results. Use line graphs to estimate values **Evaluating experimental methods & results** – Suggest ways to improve an experiment. Suggest reasons for differences in repeat readings and suggest better ways to control variables.						

	Asse ssm ent	8B1 ICA 1 8B1 ICA 2 8B1 test	8C1 ICA 1 8C1 ICA 2 8C1 test	8P1 ICA 1 8P1 ICA 2 8P1 test	8B2 ICA 1 8B2 ICA 2 8B2 test	8C2 ICA 1 8C2 ICA 2 8C2 test	8P2 ICA 1 8P2 ICA 2 8P2 test

Year 9 begin lessons designed to prepare students for GCSEs. At this level a support group (Entry Level) is formed providing additional support for those identified as would benefit from it. All students study topics P1-P3, C1-C4 and B1-B3 as described in Pearson Edexcel(9-1) Combined Science on a rolling timetable, with the entry level group being used as a vehicle to prepare these students for the same GCSEs. We intend to provide all students with a good level of science knowledge and a love of learning. All year 9 students take part in Fame lab to broaden their skills and experience of science concepts.

		Autumn		Spring		Summer	
		Term 1	Term 2	Term 3	Term 4	Term 5	Term 6
Year 9	Kno wle dge	B1 Key Concepts in Biology C1-C2 States of Matter and Separating Methods P1 Motion		B2 Cells and Control C3-C4 Atomic Structure and the Periodic Table P2 Motion and Forces		B3 Genetics P3 Conservation of Energy	
		Year 9 Science is taught on a rota system between teachers. Each class complete all topics, but there will be variety in the order that they complete them					

	Skills	<u>Numeracy Skills</u> Calculate with numbers written in standard form, Plot, draw and interpret appropriate graphs, Translate information between numerical and graphical forms, Use a scatter diagram to identify a correlation between two variables, Calculate arithmetic means. <u>Practical Skills</u> Use of specialised equipment, technical drawings, accuracy in measuring, recording and presenting results, analysis and evaluation of data, drawing conclusions, <u>Literacy Skills</u> Public speaking, Research skills, Persuasive writing and performance, Use of correct language and terminology, Exam techniques, Skimming and scanning		
	Assessment	Assessment 1, Assessment 2, End of topic tests for B1, C1 and P1.	Assessment 1, Assessment 2, End of topic tests for B2, C3-4 and P2.	Assessment 1, Assessment 2, End of topic tests for B3, and P3.

Triple classes are selected and begin studying the course at the start of year 10.

		Autumn		Spring		Summer	
		Term 1	Term 2	Term 3	Term 4	Term 5	Term 6
Year 10	Knowledge	**Separate Biology** B4 - Natural selection and genetic modification **Chemistry** C5 C6 C7 - Ionic bonding, covalent bonding and types of structures **Physics** P4 - Waves **Combined Biology**	**Biology** B5 - Health diseases and the development of medicine **Chemistry** C8 -Acids and alkalis **Physics** P5 - Light and electromagnetic spectrum **Biology** B5 - Health diseases and the development of medicine.	**Biology** B6 - Plant structure and their function **Chemistry** **C9 - C13 -** Calculations, electrolysis, obtaining and using metals, reversible reactions, equilibria, transition metals, alloys and corrosion. **Physics** P6 - Radioactivity	**Biology** B7 - Animal coordination, control and homeostasis **Chemistry** C14 C16 - Quantitative analysis, dynamic equilibria, calculations involving volumes of gases, chemical cells and fuel cells. **Physics** P7 - Astronomy	**Biology** B7 - Animal coordination, control and homeostasis **Chemistry** C16 - Chemical cells and fuel cells continued. **Physics** P10 - Electricity and circuits **Biology**	**Biology** Revision/exams **Chemistry** Revision/exams **Physics** Revision/exams **Biology** Revision/exams **Chemistry** Revision/exams

		B4 - Natural selection and genetic modification. **Chemistry** C5 C6 C7 - Ionic bonding, covalent bonding and types of structures **Physics** P4 - Waves	**Chemistry** C8 - Acids and alkalis **Physics** P5 - Light and electromagnetic spectrum.	**Biology** B6 - Plant structure and their function. **Chemistry** C9 C10 - Calculations involving masses **Physics** P6 - Radioactivity	P8/9 - Energy-forces doing work and their effects **Biology** B7 - Animal coordination, control and homeostasis. **Chemistry** C11 - Electrolysis and obtaining and using metals **Physics** P7 and P8 - Energy and forces doing work.	B7 - Animal coordination, control and homeostasis. C**hemistry** C12 - Reversible reactions and equilibria **Physics** P9 - Electricity and circuits.	**Physics** Revision and exams
	Skills	**Biology** Translating between numerical and graphical form Bar charts, histograms, line graphs, extracting information, ratios, probability. **Added on:** **B5 -** Calculating cross sections of bacterial cultures. **B6 -** Measuring rates, Correlations, inverse square law, means. **Chemistry** **C8 -** Titrations, pH testing, Numeracy - Determining pH from their concentration, Making and preparing a salt, Balancing equations, writing ionic equations and determining a formula, writing ionic half equations, Identifying and naming precipitates. **C9 -** Numeracy skills (Calculation, empirical formula, yields, concentration, moles) **C10 -** Electrolysis half equations **C11 -** Writing displacement reactions, ionic half equations, writing or determining stages of a life cycle assessment. **Physics** Numeracy - Ratios, converting units, , Drawing graphs (Linear and non- linear), Quantities and equations, Differences in motion, Converting formulae, Energy values, Half life calculations, Energy calculations, Resistance, Density					

	Assessment	ICA 1, ICA 2, End of topic assessment.	ICA 1, ICA 2, End of topic assessment.	ICA 1, ICA 2, End of topic assessment.	ICA 1, ICA 2, End of topic assessment.	ICA 1, ICA 2, End of topic assessment.	ICA 1, ICA 2, End of topic assessment.

Year 11

		Autumn		Spring		Summer	
		Term 1	Term 2	Term 3	Term 4	Term 5	Term 6
Year 11	Knowledge	**Separate Biology** B8 - Exchange in transport in animals **Chemistry** C20 Fuels C21 Earth and atmosphere Science C22 - Hydrocarbons C23 - Alcohols and carboxylic acids C24 - Polymers	**Separate Biology** B9 - Ecosystem and material cycles **Chemistry** C20 Fuels C21 Earth and atmosphere Science C22 - Hydrocarbons	**Separate Biology** Revision **Chemistry** Revision **Physics** **Combined Biology**	**Separate Biology** Revision **Chemistry** Revision **Physics** **Combined Biology**	**Separate Biology** Revision **Chemistry** Revision **Physics** **Combined Biology**	**Separate Biology** Revision **Chemistry** Revision **Physics** Revision **Combined**

		C25 Qualitative Analysis: Tests for Ions C26 Bulk and surface properties of matter including nanoparticles **Physics** P11 - Static electricity P12 - Magnetism and the motor effect P13 - Electromagnetic induction **Combined** **Biology** B8 - Exchange in transport in animals **Chemistry** C13 - Periodic table C14 - Rates of reaction C15 - heat energy changes **Physics** P10 - Magnetism and motor effect P11 - Electromagnetic induction	C23 - Alcohols and carboxylic acids C24 - Polymers C25 Qualitative Analysis: Tests for Ions C26 Bulk and surface properties of matter including nanoparticles **Physics** P14 - Particle model P15 - Forces and matter **Combined** **Biology** B9 - Ecosystems and materials cycles **Chemistry** C16 - Fuels C17 - Earth and atmosphere **Physics** P12 - Particle model P13 – Forces and matter	Revision **Chemistry** Revision **Physics** Revision	Revision **Chemistry** Revision **Physics** Revision	Revision **Chemistry** Revision **Physics** Revision	**Biology** Revision **Chemistry** Revision **Physics** Revision
	Skills	**Chemistry** **C13** - Halogen displacement reactions, **C14** - determine the rate of reaction from an experimental graph. **C15** - Measuring the enthalpy change of exo and endothermic reactions. Drawing and interpreting endo and exothermic reaction profile diagrams. Bond energy calculations. **C16 -** Drawing/ building atomic models of alkanes and alkenes. **C17 -** Comparisons and contrast between past and current climates. **Biology** B8 -Quantitative relationships Standard form Graphs Frequency tables % gain and loss B9 - As above and volume ratios, sampling as applied to scientific data					

		Physics Calculations, ratios, electricity equations, graphs (linear and nonlinear), calculations on the energy changes. Converting units Distribution of energy Thermal process Density Latent heat					
	Assessment	ICA 1, ICA 2, End of topic assessment. .	ICA 1, ICA 2, End of topic assessment.	ICA 1, ICA 2, End of topic assessment.	ICA 1, ICA 2, End of topic assessment.	ICA 1, ICA 2, End of topic assessment.	ICA 1, ICA 2, End of topic assessment.