

The Science Curriculum

The Tupton Hall Science curriculum is mapped to run over a 5(7) year plan split into the three distinct subjects of Biology, Chemistry and Physics, these have then been split into smaller strands that underpin the entirety of that area, Biology follows the strands of Organisation (cells are alive, bodies of systems) Ecosystems (organisms are interdependent) and Genes (characteristics are inheritance) Chemistry (matter) split into the ideas of structure determines properties, reactions arrange matter and earth systems interact. Physics split into the strands of Forces (forces predict motion and fields produce forces) and energy (energy is conserved, electricity transfers energy and radiation transfers energy) These areas have then been further split into teaching topics for Ks3 ensuring that a focus is on skills development in KS3 to enable the content to be underpinned with these skills throughout the 5(7) years of Science.

Pupils study all strands of science in KS3 with an emphasis on skills to ensure students get a broad understanding of science and its applications Students can also develop their understanding by choosing separate science courses at GCSE, or go onto Trilogy Science course, some students also will complete entry level certificate in Science single or double award alongside their GCSEs to enable deeper understanding.

At A level students can lead into conventional routes like Biology, Chemistry and Physics but also to the new A level environmental Science course.

Extra-curricular

The Science department offers various extra-curricular offerings, (see list below) allowing students of all ages in all year groups to attend a session that supports skills improvement. We also run various year group and subject specific interventions.

- Science Club
- Space Club
- Homework club
- Crest Club
- Stem club
- National geographic journal club
- Y12 Intermediate Biology Competition (June)
- Y12 Cambridge Chemistry Challenge (June)
- Y12 Senior Physics Challenge (January)
- Y13 British Biology Olympiad (January)
- Y13 UK Chemistry Olympiad (January)
- Y13 British Physics Olympiad (November)
- Y13 Physics Challenge (Sept-Nov)

Curriculum Intent

The Science curriculum aims to ensure that all children **develop scientific knowledge** and conceptual understanding through the specific disciplines of Biology, Chemistry and Physics.

We aim to ensure students develop an understanding of the nature, processes and methods of Science through **scientific enquiry** which will enable them to answer scientific questions about **the world around them**.

Create learners who are equipped with the **scientific skills** required to understand the **uses and implications of science today and for the future**.

Curriculum Implementation

We implement the intent of our curriculum through:

KS3 curriculum designed to ensure acquisition of practical skills as its priority

Interleaving of whole cohort assessments

Lessons including links to careers and professions linked to the learning.

Clear lesson structures including recall, careers, exam techniques and objectives/outcomes

Project based activities incorporated into KS3

Science week *

Recall booklets introduced.

Specialist teachers throughout KS4

Trips/events *

Teachers in Science create a positive attitude to science learning within their classrooms and reinforce an expectation that all children are capable of achieving their best in Science.

Our approach to achieving our intent in science involves the following:

Science is taught in planned and arranged topic blocks with the emphasis in KS3 being on practical skills and investigation work with targeted project work throughout the 3 years, Ks4 are taught in specialised planned units and delivered by subject specific teachers, this should allow for students to achieve a greater depth of knowledge and understanding, it will also enable a greater enjoyment in the subject and so increase motivation.

We build upon the learning and skills development of the previous years, through key tests for all years including a large percentage of interleaving work. We are introducing recall homeworks to all year groups. And all lessons in all year groups are to include recap of previous lessons and of blast from the past key questions to ensure students are embracing prior learning.




Working scientifically skills are embedded into lessons to ensure students are able to use the key terms and key skills throughout their science career. These new vocabulary and challenging concepts are introduced through teaching and built upon throughout the Key stages throughout the various topics covered.

When planning/ adapting the lessons teachers ensure the lessons are challenging for the students and encourage them to ask and respond to questioning. Teachers use assessments and questioning wisely to understand areas of weakness and gaps in knowledge to design feedback activities to bridge the gaps

The lessons are also designed to embed key new vocabulary and professions linked to the learning to ensure students where the learning leads .

Students are offered various extra curriculum activities in science to broaden the curriculum and add to the learning that has been carried out in lessons, these are really useful to ensure students are motivated and engaged with the subject and its difficult concepts, these include Science clubs, homework clubs, interventions, science week and trips

5 year curriculum map: Biology

Area	Big idea	1	2	3	4	5
 Organisms	Cells are alive	Cells (AF3)		Cell structure (AF2) Cell systems (AF1)		
	Bodies of systems	Structure of body systems (AF4,AF5)	Biological processes (AF4, AF5) Healthy living (AF5)	Cell Systems (AF1)	B5 Communicable diseases B6 Preventing and treating diseases B7 Non communicable diseases B8 Photosynthesis B9 Respiration B10 Nervous system B11 Hormonal control B12 Homeostasis	
 Ecosystems	Organisms are interdependent		Ecosystems and adaptation (AF3)	Variation and natural selection (AF1)	B4 Organising animals and plants	B16 Adaptation B17 Organising an ecosystem B18 Biodiversity and ecosystems
 Genes	Characteristics are inherited?	Reproduction (AF1)	Inheritance (AF2)	Fertilisation and implantation (AF1)	B13 B14	B13 Reproduction and variation B14 Variation and evolution B15 Genetics and evolution




Year 1 and 2 have an emphasis on skills development (strand focus)

Year 4 and 5 have an emphasis of consolidation and acquisition of knowledge

Year 3 has been designed as a mixture of skills development and knowledge building (strand focus)

Separate Biology (if different to Trilogy Biology)

7 year curriculum map: Biology

Area	Big idea	6	7
 Organisms	Cells are alive	3.2.1 - 3.2.2 Cell structure 3.2.3 Transport across membrane	
	Bodies of systems	3.1.1 - 3.1.4 Biological molecules 3.2.4 Cell recognition and immune system 3.3.1 - 3.3.3 Exchange 3.3.4 Mass Transport	3.5.1 Photosynthesis 3.5.2 Respiration 3.6.2 - 3.6.3 Nervous coordination and muscles 3.6.4 Homeostasis 3.5 Biological Resources (Environmental Science) 3.6 Sustainability (Environmental Science)
 Ecosystems	Organisms are interdependent	3.4.5 - 3.4.7 Biodiversity 3.5.3 - 3.5.4 Energy and ecosystems (A' level content) 3.7.4 Populations in ecosystems (A' level content) 3.1 The living environment (Environmental Science)	3.6.1 response to stimuli
 Genes	Characteristics are inherited?	3.1.5 Nucleic acids 3.4.1 - 3.4.2 DNA, genes and protein synthesis 3.4.3 - 3.4.4 Genetic diversity	3.7.1 Inherited change 3.7.2 - 3.7.3 Populations and evolution 3.8.1 - 3.8.3 Gene expression 3.8.4 Recombinant DNA technology

AF1 – Thinking scientifically


AF2 - Understanding the applications and implications of Science

AF3 – Communicating and collaborating in Science

AF4 – Using investigative approaches

AF5 - Working critically with evidence

5 year curriculum map: Chemistry

Area	Big idea	1	2	3	4	5
 Matter	Structure determines properties	Particles (AF1) Elements and atoms (AF3) -	Periodic table (AF3) Separating solutions (AF4)	Atomic structure (AF5) The periodic table developments (AF1)	C3 Structure and bonding C4 Chemical calculations C6 Electrolysis	C12 Chemical analysis
	Reactions arrange matter	Chemical reactions (AF4) Acids and Alkalis (AF4)	Metals and acids (AF4)	Chemical changes (AF4) Useful chemical reactions (AF3)	C5 Chemical changes	
	Earth systems interact		The Earth (AF1)		C9 C10 Organic reactions	C9 Hydrocarbons C11 Polymers C13 Earths atmosphere C14 Earths resources C15 Using our resources


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Separate Chemistry (if different to Trilogy Chemistry)

7 year curriculum map: Chemistry

Area	Big idea	6	7
 Matter	Structure determines properties	3.1.1 Atomic Structure 3.1.2 Amount of Substance 3.1.3 Bonding 3.2.1 Periodicity 3.2.4 Period 3 Oxides (A' level content) 3.2.2 Group 2 3.2.3 Group 7 3.3.5 Alcohols 3.3.6 Organic Analysis	3.2.5 Transition Metals 3.3.7 Nomenclature and Isomerism 3.3.8 Aldehydes and Ketones 3.3.9 Carboxylic Acids and Derivatives 3.3.10 Aromatic Chemistry 3.3.15 NMR
	Reactions arrange matter	3.1.4 Energetics 3.1.5 Kinetics 3.1.6 Equilibria 3.1.7 Redox 3.1.9 Rate equations (A' level content) 3.1.10 Equilibrium Constant Kp (A' level content)	3.1.8 Thermodynamics 3.1.11 Electrode Potentials and Electrochemical Cells 3.2.6 Reactions of Ions in Aqueous Solution 3.1.12 Acids and Bases (A' level content) 3.4 Pollution (Environmental science)
	Earth systems interact	3.3.1 Introduction to Organic Chemistry 3.3.2 Alkanes 3.3.3 Haloalkanes 3.3.4 Alkenes 3.2 The Physical Environment (Environmental Science)	3.3.11 Amines 3.3.12 Polymers 3.3.13 Amino Acids, Proteins and DNA 3.6 Sustainability (Environmental Science)

AF1 – Thinking scientifically



AF2 - Understanding the applications and implications of Science

AF3 – Communicating and collaborating in Science

AF4 – Using investigative approaches

AF5 - Working critically with evidence

5 year curriculum map: Physics

Area	Big idea	1	2	3	4	5
 Forces	Forces predict motion		Motion (pressure) (AF1)	Forces and motion (AF5)	P8	P8 Forces in balance P9 Motion P10 Forces and motion P11 Force and pressure
	Fields produce forces	Forces (introduce) (AF2) Space/universe (AF3)			P16 Space	
 Energy	Energy is conserved	Light (AF5) -	Energy (AF5)	Energy changes (AF2)	P1 Conservation and dissipation of energy P2 Energy transfer by heating	
	Electricity transfers energy	-	Electricity (AF2)	Electrical circuits and magnetism (AF4)		
	Radiation transfers energy	Waves/Sound (AF1) Space/universe (AF3)	Waves (AF1)	Waves, sound and light (AF1)	P7 Radioactivity P12 Wave properties P13 Electromagnetic waves	P14 Light P15 Electromagnetism



Year 1 and 2 have an emphasis on skills development (strand focus)

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Separate Physics (if different to Trilogy Physics)

7 year curriculum map: Physics

Area	Big idea	6	7
Optional topic 3.13 Electronics  Forces	Forces predict motion	3.1 Measurements and their errors 3.4.1 Force, energy and momentum (1-4) 3.4.2 Materials 3.6.1 Periodic motion (A' level content)	3.1 Measurements and their errors Optional topic 3.11 Engineering physics
	Fields produce forces	3.1 Measurements and their errors	3.1 Measurements and their errors 3.7.1 Fields 3.7.2 Gravitational fields 3.7.3 Electric fields 3.7.5 Magnetic fields (1&2)
 Energy	Energy is conserved	3.1 Measurements and their errors 3.4.1 Force, energy and momentum (5-8) 3.6.2 Thermal physics (A' level content)	3.1 Measurements and their errors 3.3 Energy Resources (Environmental Science) 3.6 Sustainability (Environmental Science)
	Electricity transfers energy	3.1 Measurements and their errors 3.5.1 Current electricity	3.1 Measurements and their errors 3.7.4 Capacitance 3.7.5 Magnetic fields (3-6)
	Radiation transfers energy	3.1 Measurements and their errors 3.2.1 Particles 3.2.2 Electromagnetic radiation and quantum phenomena 3.3.1 Progressive and stationary waves 3.3.2 Refraction, diffraction and interference	3.1 Measurements and their errors 3.8.1 Radioactivity Optional topic 3.9 Astrophysics Optional topic 3.10 Medical physics

AF1 – Thinking scientifically

AF2 - Understanding the applications and implications of Science

AF3 – Communicating and collaborating in Science

AF4 – Using investigative approaches

Science 5 year assessment plan

	Building a Platform		Building Purpose		Building Impact	
Y7 Test 1	KS2	Y7 Autumn Units	Y7 Autumn Units	Y7 Autumn Units	Y7 Autumn Units	Y7 Autumn Units
Y7 Test 2		Y7 Autumn Units	Y7 Spring Units	Y7 Spring Units	Y7 Spring Units	Y7 Spring Units
Y7 Test 3		Y7 Spring Units	Y7 Summer Units	Y7 Summer Units	Y7 Summer Units	Y7 Summer Units
Y8 Test 1	Y7	Y7	Y8 Autumn Units	Y8 Autumn Units	Y8 Autumn Units	Y8 Autumn Units
Y8 Test 2	Y7 Units	Y8 Autumn Units	Y8 Spring Units	Y8 Spring Units	Y8 Spring Units	Y8 Spring Units
Y8 Test 3	Y7 Units & y8 Autumn Term	Y8 Spring Units	Y8 Summer Units	Y8 Summer Units	Y8 Summer Units	Y8 Summer Units
Y9 Test 1	Y7 & 8 Units	Y7 & 8 Units	Y9 Autumn Units ExamPro S Exam Pro	Y9 Autumn Units AO2 S AO2	Y9 Autumn Units ExamPro S Exam Pro	Y9 Autumn Units AO2 S AO2
Y9 Test 2	Y7 & 8 Units	Y7 & 8 Units	Y9 Autumn & Spring Units ExamPro Scaffolded Exam Pro	Y9 Autumn & Spring Units AO2 AO2 Scaffolded	Y9 Autumn & Spring Units ExamPro Scaffolded Exam Pro	Y9 Autumn & Spring Units AO2 AO2 Scaffolded
Y9 Test 3	Y7 & 8 Units	Exampro Scaffolded Exampro	Y9 Units	AO2 Scaffolded AO2	Y9 Units	AO2 Scaffolded AO2
Y10 Test 1	Y9 Units	Y9 Units	Y10 Autumn Units	Y10 Autumn Units	Y10 Autumn Units	Y10 Autumn Units
Y10 Test 2	Y9 Units	Y10 Autumn Units	Y10 Spring Units	Y10 Spring Units	Y10 Spring Units	Y10 Spring Units
Y10 Test 3	Y9 Units	Y10 Autumn Units	Y10 Spring Units	Y10 Summer Units	Y10 Spring Units	Y10 Summer Units
Y10 Mock	2018 Paper 1&2					
Y11 Test 1	2019 Paper 1&2					
Y11 Mock 1	2019 Paper 1&2					
Y11 Mock 2	2019 Paper 3&4					