

Curriculum Statement of Intent and Implementation:

“A new curriculum to meet the needs of our students in a changing society and the raising of aspirations for all.” – Mr P Green (Headteacher, Lyng Hall)

At Lyng Hall we believe that students should know the prerequisites for any science subject in order to learn more complex subjects, for example, students study atoms and molecules in year 7, not just particles. Students in year 9 know the differences between atoms and ions before they study rates of reaction and quantitative chemistry in year 10.

5-year Curriculum:

Our science team are proud of the 5 year curriculum that we are developing, which secures the fundamentals of science in a logical manner to allow students to access a much higher level of subject knowledge towards the final stages of school.

During the course, our students will focus on retaining the basic knowledge of each subject.

Intertwined in the knowledge-focused lessons will be the development of key scientific, mathematical and literacy skills, as well as exposure to practical experiments to improve precision of readings, accuracy of measurements, processing of data, drawing conclusions and analysis of results.

Effective Teaching for understanding and recall:

Staff at Lyng hall believes that teaching with the principles of Cognitive Science, i.e. Cognitive load theory, will help support our students in gaining access to, storing and achieving fluency and mastery in gaining knowledge and understanding. Underpinning our curriculum is the concept of schema: building knowledge that is secure, deep, well organised, retrievable with some fluency and can be applied to new concepts.

The goal – when we are teaching new knowledge, we want all students to know it, all of it, ‘Making it stick isn’t something we hope for; it’s something we plan for and drive through.’ And to ‘know’ means – recall, use, apply, explain – also known as ‘understand’.

Fundamental factors in teaching this curriculum well - if everyone is to know all the knowledge under consideration, then:

- The fundamental knowledge needs to be clear, i.e. powerful knowledge;
- Everyone in the class needs to be involved;
- Students need to be able to check their own understanding as much as the teacher does; Checking needs to come before practising;
- Finally, students need independent practice – ‘doing it myself without help’.

The wonder of Science:

At Lyng Hall we also promote the excitement of scientific investigation – to:

- (i) bring life to the theory and underpinning knowledge of many of the most fundamental scientific concepts and nurturing a life-long interest in science, and;
- (ii) provide opportunities to develop skills crucial in science and engineering careers, including precision, accurate measurement, and the mastery of often delicate equipment.
- (iii) develop important transferrable skills, such as team-work, resilience and analysis.

“Fundamentally, science is a practical discipline and, by undertaking good practical science at school, one gains a sense of what working in a science-related occupation might actually involve.” – Lord Sainsbury (Gatsby Foundation)

Beyond the Curriculum:

A wide and deep bank of subject knowledge will allow our students to leave Lyng Hall with the ability to ask better questions of the world, make more informed decisions and apply their knowledge to unfamiliar situations. We want our students to leave knowing how scientific discoveries are hypothesised, tested and peer reviewed. We want our students to have a scientific understanding of the world, so they can comprehend developments in the news, study at A' Level or degree, become an expert tradesman, engage in scientific conversations at any age of their life, appreciate the impact they have on the environment even help their own children with the homework!

See the Science Department Action Plan for details of current and planned implementation to achieve these aspirations.

(See also Department Frog Files for more documents and information)

NEW Science Curriculum 2018 Onwards

Years 7 through to 11 will follow a five-year AQA science curriculum based around 10 big ideas in science. The curriculum map below shows how the 10 big ideas and core concepts are spread and reinforced throughout the 5 years in topics. <http://www.aqa.org.uk/subjects/science/ks3/ks3-science-syllabus>

GCSE (1-9) Double Science Schema <https://www.aqa.org.uk/subjects/science/gcse/combined-science-synergy-8465>

BIG IDEAS	Y7		Y8		Y9		Y10			Y11
FORCES	Speed	Gravity	Contact Forces	Pressure			P1 Forces			
ELECTROMAGNETISM	Voltage, Current and resistance		Electromagnets	Magnetism			P4 Electricity			P5 Magnetism and Electromagnetism
ENERGY	Cost and Transfer		Work	Heating and Cooling	P2 Energy		C5 Energy changes			
WAVES	Sound and Light		Wave effects	Wave Properties	P3 Waves					P8 Space Physics
MATTER	Particle model		Separating mixtures	Periodic table and elements	C1 Atomic structure & the Periodic table	C2 Bonding	P7 Radiation & Risk	P6 Particle matter	C6 Rates of reaction	C7 Organic chemistry
REACTIONS	Metals and non-metals	Acids and Alkalis	Chemical energy	Types of reaction			C3 Quantitative Chemistry	C4 Chemical changes	C8 Chemical analysis	
EARTH	Structure	Universe	Climate	Energy resources			C10 Resources			C9 Chemistry of the atmosphere
ORGANISMS	Movement and Cells		Breathing	Digestion	B1 Cells	B2 Organisation	B3 Infection and response	B5 Homeostasis		
ECOSYSTEM	Plant Reproduction & Interdependence		Respiration	Photosynthesis			B7 Ecology			
GENES	Variation	Human reproduction	Evolution	Inheritance			B4 Biogenetics			B6 Inheritance, Variation and Evolution

GCSE (1-9) Triple Science Schema <https://www.aqa.org.uk/subjects/science/gcse/biology-8461> ; for chemistry replace with (chemsitry-8462) and (physics-8463)

BIG IDEAS	Y7		Y8		Y9		Y10			Y11
FORCES	Speed	Gravity	Contact Forces	Pressure			P8 Forces in balance	P9 Motion	P10 Force and Motion	
ELECTROMAGNETISM	Voltage, Current and resistance		Electromagnets	Magnetism	P4 Electrical Circuits	P5 Electricity in the Home	P13 Electromagnetism			
ENERGY	Cost and Transfer		Work	Heating and Cooling	P1 Conservation and dissipation of energy	P2 Energy transfer by heating	P3 Energy resources			
WAVES	Sound and Light		Wave effects	Wave Properties	P11 Wave properties		P12 Electromagnetic waves			
							P7 Radioactivity			
MATTER	Particle model		Separating mixtures	Periodic table and elements	C1 Atomic structure C2 Periodic table	C3 Structure and Bonding	P6 Molecules and matter	C6 Rates of reaction		C9 Crude Oil and fuels
REACTIONS	Metals and non-metals	Acids and Alkalis	Chemical energy	Types of reaction	C4 Chemical calculations		C5 Chemical Changes	C7 Energy Changes	C8 Rates and equilibrium	C7 Organic Chemistry
EARTH	Structure	Universe	Climate	Energy resources			C6 Electrolysis			C11 The Earth's atmosphere & C12 The Earth's resources
ORGANISMS	Movement and Cells		Breathing	Digestion	B1 Cell Structure & Transport	B2 Cell Division	B3 Organisation and the digestive system	B4 Organising animals and plants B5 Homeostasis		B10 The human nervous system & B11 Hormonal co-ordination
							B5 Communicable diseases & B6 Preventing and treating diseases & B7 Non-communicable disease			
ECOSYSTEM	Plant reproduction & Interdependence		Respiration	Photosynthesis	B8 & B9 Photosynthesis & Respiration		B15 Adaptations, interdependence and competition			B16 Organising and ecosystem & B17 Biodiversity
GENES	Variation	Human reproduction	Evolution	Inheritance	B12 Reproduction		B13 Variation & Evolution			B14 Genetics & Evolution

KS3 Long-term Plan

Year 7	Week	Topic and AQA PoS reference	
Term 1	1-3	Baseline Test	
		Introduction to Practicals (6 hours +1 assessment)	
	4-6	Gravity and Speed 3.1.1 & 3.1.2 (9 hours +1 assessment)	
	7-8	Particle Model 3.5.1 (5 hours +1 assessment)	
	9	Separating Mixtures 3.5.2 (4 hours +1 assessment)	
	10-11	Movement 3.8.1 (4 hours +1 assessment)	
	12-13	Cells 3.8.2 (5 hours +1 assessment)	
	14-16	Voltage, Current and Resistance 3.2.1 & 3.2.2 (8 hours +1 assessment)	
	Term 2	17-19	Metals and Non-metals 3.6.1 & Acids and Alkalis 3.6.2 (9 hours + 1 assessment)
		20-22	Interdependence 3.9.1 & Plant Reproduction 3.9.2 (8 hours +1 assessment)
23-26		Energy transfer and cost 3.3.1 & 3.3.2 (9 hours +1 assessment)	
Term 3	27-29	Earth structure and Universe 3.7.1 & 3.7.2 (9 hours +1 assessment)	
	30-33	Variation 3.10.1 & Human Reproduction 3.10.2	

		(8 hours +1 assessment)
	34-36	Sound and Light 3.4.1 & 3.4.2 (10 hours +1 assessment)
Year 8	Week	Topic and AQA PoS reference
Term 1	1-3	Contact Forces and Pressure 3.1.3 & 3.1.4 (8 hours +1 assessment)
	4-6	Elements and Periodic Table 3.5.3 & 3.5.4 (8 hours +1 assessment)
	7-9	Breathing and Digestion 3.8.3 & 3.8.4 (8 hours +1 assessment)
	10-12	Magnetism and Electromagnetism 3.2.3 & 3.2.4 (5 hours +1 assessment)
	14-16	Types of Reaction & Chemical Energy 3.6.3 & 3.6.4 (8 hours +1 assessment)
Term 2	17-20	Respiration and Photosynthesis 3.9.3 & 3.9.4 (10 hours +1 assessment)
	21-23	Work - Heating and Cooling 3.3.3 & 3.3.4 (6 hours +1 assessment)
	23-26	Climate & Earth Resources 7.3.3 & 7.3.4 (7 hours +1 assessment)
Term 3	27-29	Evolution 3.10.3 & Inheritance 3.10.4 (7 hours +1 assessment)
	30-31	Wave Effects & Properties 3.4.3 & 3.4.4 (5 hours +1 assessment)
	32	Microbiology

33- 34	(4 hours)
	Project and Presentation
	Preparation for GCSE

AQA GCSE (9-1) Combined Science: Synergy Three-Year Long-term Plan

		Topic and Text Chapter (~ weeks)	
Year 9	Week	Paper 1 & 2	
Term 1	1-2	Chpt. 1.2 (2) Atomic Structure	
	3-6	Chpt. 1.3 (4.5) Cells	
	7-10	Chpt. 1.1 (3) States of Matter	
	11-12	Chpt. 4.2 (2) Ecosystems and Biodiversity	
	13	Chpt. 4.3 (1.5) Inheritance	
Term 2	14-15	Chpt. 4.4 (2.5) Variation & Evolution	
	16-18	Chpt. 4.1 (2.5) The Earth's Atmosphere	
	19-23	Chpt. 2.1 (5) Systems in the Human Body	
	24-26	Chpt. 2.2 (3) Plants and Photosynthesis	
Term 3	27-31	Chpt. 3.1 (5) Lifestyle and Health	
	32-38	Chpt. 3.3 (7.5)	

Year 10	Week	Paper 1 & 2
	1-2	Chpt. 1.4 (2) Waves
	3-4	Chpt. 3.2 (1.5) Radiation & Risk
		Revision Mocks for Paper 1 & 2
Term 1	Week	Paper 3 & 4
	5-7	Chpt. 5.1 (3) Periodic Table
	8-9	Chpt. 7.5 (2) Atoms into Ions
	10-13	Chpt. 6.2 (4) Structure & Bonding
Term 2	14-18	Chpt. 6.1 (5.5) Forces
	19-21	Chpt. 7.1 (2.5) Forces & Motion
	22-25	Chpt. 7.3 (2.5) Acids & Alkalis
Term 3	26-30	Chpt. 7.4 (5) Rate and Extent of Chemical Change
	31-34	Chpt. 4.8 (3.5) Carbon Chemistry
	35-37	Chpt. 5.2 (3) Chemical Quantities

Year 11	Week	Paper 3 & 4
Term 1	1-3	Chpt. 7.2 (3) Electricity
	4-6	Chpt. 6.3 (3) Magnetism & Electromagnetism
	7-9	Chpt. 8.2 (3) Resources of Materials & Energy
Term 2	Revision	
	Revision	
	Revision	
	Revision	
	Revision	
Term 3	Revision	
	Revision	
	Revision	
	Revision	
	Revision	

Biology Paper 1	
1 Cells and organisation	2 Disease and bioenergetics
B1 Cell structure and transport (~10)	B5 Communicable diseases (~11)
B2 Cell division (~4)	B6 Preventing and treating disease (~6)
B3 Organisation and the digestive system (~7)	B7 Non-communicable diseases (~5)
B4 Organising animals and plants (~9)	B8 Photosynthesis (~4)
	B9 Respiration (~4)

Biology Paper 2		
3 Biological responses	4 Genetics and reproduction	B5 Ecology
B10 The human nervous system (~6)	B12 Reproduction (~10)	B15 Adaptations, interdependence, and competition (~8)
	B13 Variation and Evolution (~7)	B16 Organising and ecosystem (~4)
B11 Hormonal coordination (~15)	B14 Genetics and Evolution (~10)	B17 Biodiversity and ecosystems (~12)

Chemistry Paper 1	
1 Atoms, bonding, and moles	2 Chemical reactions and energy changes
C1 Atomic structure (~8)	C5 Chemical changes (~8)
C2 The periodic table (~6)	C6 Electrolysis (~4)
C3 Structure and bonding (~12)	C7 Energy changes (~6)
C4 Chemical calculations (9)	

Chemistry Paper 2	
3 Rates, equilibrium and organic chemistry (~13)	4 Analysis and the Earth's resources
C8 Rates and equilibrium (~9)	C10 Chemical analysis (~6)
	C11 The Earth's atmosphere (~5)
C9 Crude oil and fuels (~8)	C12 The Earth's resources (~14)

Physics Paper 1	
1 Energy and energy resources	2 Particles at work
P1 Conservation and dissipation of energy (~9)	P4 Electric circuits (~6)
	P5 Electricity in the home (~5)

Physics Paper 2	
3 Forces in action	4 Waves, electromagnetism, and space
P8 Forces in balance (~9)	P11 Wave properties (~7)
	P12 Electromagnetic waves (~10)

P2 Energy transfer by heating (~5)	P6 Molecules and matter (~7)	P9 Motion (~4)	
P3 Energy resources (5)	P7 Radioactivity (~9)	P10 Force and motion (~12)	P13 Electromagnetism (~13)

The composition of the Earth and its atmosphere and the processes occurring within them shape the Earth's surface and its climate.

Changing the movement of an object requires a net force to be acting on it.

Objects can affect other objects at a distance.

Organisms are organised on a cellular basis.

All material in the Universe is made of very small particles.

The Big Ideas Of Science

Our solar system is a very small part of one of millions of galaxies in the Universe.

The diversity of organisms, living and extinct, is the result of Evolution.

Genetic information is passed down from one generation of organisms to another.

The total amount of energy in the Universe is always the same but energy can be transformed when things change or are made to happen.

Organisms require a supply of energy and materials for which they are often dependent on or in competition with other organisms.