



# Science Department

## Subject Intent

We seek to encourage students to have a sense of curiosity and wonder at the complexity of the world around them. As Einstein famously said, “the important thing is never to stop questioning.” Our Science curriculum helps students to learn to see the world analytically through the acquisition of knowledge, development of scientific skills and the recognition that problems can be solved. Our mastery curriculum is based on the ten key themes of science; forces, electromagnetism, energy, waves, matter, reactions, earth, organisms, ecosystems and genes and the spiral sequencing enables students to revisit these themes as they progress further through their learning journey.

## Core Subject Principles

- **Dignity**

We promote a positive learning environment where students can openly discuss key scientific ideas and feel valued as a learner. Students develop confidence throughout our mastery curriculum, resulting in self-belief when applying skills and knowledge to the real world and examinations.

- **Respect**

We develop students’ respect for one another by creating a positive learning environment where they feel safe to contribute their opinions and learn from the ideas of others. We also encourage students to have respect for the environment and to have an awareness the Earth’s precious resources which need to be used efficiently and responsibly.

- **Wisdom**

We encourage students to make wise choices in learning as they grow in scientific knowledge and independence. Our curriculum enables ongoing development in thinking scientifically; drawing substantiated scientific conclusions and making cogent scientific judgements.

- **Knowledge**

We aim to develop students’ knowledge linked to the fundamental principles of biology, chemistry and physics. This knowledge is carefully sequenced over time due its ever-growing complexity. Our spiraled mastery curriculum gives students opportunity to revisit key areas and address any misconceptions before new ideas are presented to them, increasing confidence with subject matter, and presenting providing opportunities to showcase their understanding.

- **Skills**

We teach students to develop a broad range of skills including scientific enquiry, problem-solving, data handling, experimental techniques and communication of key scientific ideas. We build upon these skills throughout all key stages enabling pupils to confidently handle unseen problems and identify how the skills they develop can be applied in real life situation and scientific careers.

- **Aspirations**

We inspire confident students who will thrive in an ever-changing world, allowing them to participate in an increasingly scientific and technological society. We set high expectations for all students and encourage self-improvement and independent learning. We are a passionate team of scientists who routinely highlight the importance of science in a broad range of career pathways, inspiring our learners to ask questions about the world around them and aspire to apply scientific knowledge, marvel at scientific wonders or pursue STEM-related careers.

- **Hope**

Students will be nurtured to sustain a positive state of mind in reaching their own potential and more so, have a broader hope that their own scientific contributions, modified behavior or scientific discovery can work together to make the world a better place.

## Study Areas

Key Stage 3 Programmes of Study: Academic Year 19-20						
Terms	Year 7	Core	Year 8	Core	Year 9	Core
1	<p>Introduction to Science: practical skills and working scientifically</p> <p>Biology: Movement and cells</p>		<p>Physics: Sound and light</p> <p>Chemistry: Periodic table</p>		<p>Biology: Evolution</p> <p>Chemistry: Earth's resources</p> <p>Physics: Contact Forces</p>	
2	<p>Physics: Speed and gravity</p> <p>Chemistry: Particle model and mixtures</p> <p>Working scientifically: Christmas themed practical work</p>		<p>Chemistry: Metals and non-metals</p> <p>Biology: Breathing and digestion</p> <p>Working scientifically: Christmas themed practical work</p>		<p>Biology: Inheritance</p> <p>Chemistry: Climate</p> <p>Physics: Pressure</p> <p>Working scientifically: Christmas themed practical work</p>	
3	<p>Physics: Voltage and current</p> <p>Biology: Variation</p>		<p>Physics: Speed and gravity</p> <p>Chemistry: Elements, and mixtures</p>		<p>Structured revision for internal exams</p> <p>Biology: Organisms, ecosystems, genes</p> <p>Chemistry: Matter, reactions, Earth</p> <p>Physics: Forces, electromagnets, energy and waves</p>	
4	<p>Biology: Human Reproduction</p> <p>Physics: Sound and light</p>		<p>Biology: Respiration and photosynthesis</p>		<p>Bridging the gaps and consolidating knowledge from KS3</p> <p><i>Starting KS4 content</i></p>	

5	Chemistry: Metals and non-metals		Physics: Work and heating Biology: Interdependence		Biology: Cell biology Chemistry: Atomic structure and the periodic table	
6	Biology: Interdependence and plant reproduction Working scientifically: Summer themed practical work		Chemistry: Reactions Working scientifically: Summer themed practical work		Physics: Atomic structure Working scientifically: Summer themed practical work	

Key Stage 3 Programmes of Study: From 2020 onwards						
Terms	Year 7	Core	Year 8	Core	Year 9	Core
1	Introduction to Science: practical skills and working scientifically Biology: Movement and cells		Chemistry: Chemical energy and types of reaction Physics: Energy costs and energy transfer		Biology: Evolution Chemistry: Earth's resources Physics: Contact Forces	
2	Physics: Speed and gravity Chemistry: Particle model and mixtures Working scientifically: Christmas themed practical work		Biology: Breathing and digestion Working scientifically: Christmas themed practical work		Biology: Inheritance Chemistry: Climate Physics: Pressure Working scientifically: Christmas themed practical work	
3	Physics: Voltage and current Biology: Variation		Physics: Wave effects and wave properties Chemistry: Periodic table and elements		Structured revision for internal exams Biology: Organisms, ecosystems, genes Chemistry: Matter, reactions, Earth	

				Physics: Forces, electromagnets, energy and waves	
4	Biology: Human Reproduction Physics: Sound and light		Physics: Magnetism and electromagnets Chemistry: Earth structure and the universe	Bridging the gaps and consolidating knowledge from KS3 <i>Starting KS4 content</i>	
5	Chemistry: Metals and non-metals		Biology: Respiration and photosynthesis	Biology: Cell biology Chemistry: Atomic structure and the periodic table	
6	Biology: Interdependence and plant reproduction Working scientifically: Summer themed practical work		Physics: Work and heating Working scientifically: Summer themed practical work	Physics: Atomic structure Working scientifically: Summer themed practical work	

## Key Stage 4 Programmes of Study

Terms	Year 10	Core	Year 11	Core
1	<p>Biology: Organisation</p> <p>Chemistry: Structure and bonding</p> <p>Physics: Energy</p> <p>HSW lessons: Variables, method writing, data handling, describe and explain and evaluate</p>		<p>Biology: Ecology</p> <p>Chemistry: Rates</p> <p>Physics: Forces</p> <p>HSW lessons: Variables, method writing, data handling</p>	
2			<p>Biology: Homeostasis and response</p> <p>Chemistry: Organic chemistry</p> <p>Physics: Forces</p> <p>HSW lessons: describe and explain, evaluate, science revision strategies</p>	
3	<p>Biology: Infection and response</p> <p>Chemistry: Energy changes</p> <p>Physics: Electricity</p> <p>HSW lessons: Estimate, calculate, required practicals and scientific models</p>		<p>Biology: Inheritance, variation and evolution</p> <p>Chemistry: Chemical analysis and the atmosphere</p> <p>Physics: Waves, and electromagnetism</p> <p>HSW lessons: interpreting data, required practical circus</p>	
4	<p>Biology: Infection and response</p> <p>Chemistry: Quantitative chemistry</p> <p>Physics: Electricity</p> <p>HSW lessons: Plotting graphs, science in the media, method writing</p>		<p>Consolidation and bridging gaps of paper two knowledge</p> <p>HSW lessons: science revision strategies, describe, explain, evaluate, compare, plotting graphs</p>	

5	<p>Biology: Bioenergetics</p> <p>Chemistry: Chemical changes</p> <p>Physics: Particles</p> <p>HSW lessons: Reliability, validity, errors, required practical circus</p>	<p>Paper 1 Structured revision</p> <p>HSW lessons: skills/key language for science papers</p> <p><b>Paper 1 Exams: Biology, Chemistry and Physics</b></p>	
6	<p>Biology: Introduction to Ecology</p> <p>Chemistry: Introduction to Rates</p> <p>Physics: Introduction to Forces</p> <p>HSW lessons: Science revision strategies</p>	<p>Paper 2 Structured revision</p> <p>HSW lessons: skills/key language for science papers</p> <p><b>Paper 2 Exams: Biology, Chemistry and Physics</b></p>	

Terms	Year 12	Core	Year 13	Core
1	Topic 1: Biological Molecules Topic 2: Cells, viruses and reproduction of living things		Topic 6: Microbiology and pathogens Topic 10: Ecosystems	
2	Topic 1: Biological Molecules Topic 2: Cells, viruses and reproduction of living things		Topic 5: Energy for Biological Processes Topic 9: Control Systems	
3	Consolidation of topic 1 and 2 Topic 3: Classification and biodiversity Topic 4: Exchange and transport		Topic 9: Control Systems Topic 7: Modern Genetics	
4	Topic 3: Classification and biodiversity Topic 4: Exchange and transport		Topic 9: Control Systems Topic 8: Origins of genetic variation	
5	Consolidation of topic 1-4 Exam practice		Exam practice Consolidation of knowledge	
6	Start of year 13 content Topic 6: Microbiology and pathogens Topic 10: Ecosystems			



## Key Stage 5 Chemistry Programme of Study

Terms	Year 12	Core	Year 13	Core
1	Physical Chemistry: Atomic structure and amount of substance Organic Chemistry: Introduction to organic chemistry		Physical Chemistry: Rate equations Organic Chemistry: Optical isomerism and carbonyl compounds	
2	Physical Chemistry: Energetics, bonding and kinetics Organic Chemistry: Alkanes and halogenoalkanes		Physical Chemistry: Thermodynamics and Equilibrium constant $K_p$ Organic Chemistry: Nuclear magnetic resonance spectroscopy and chromatography	
3	Physical Chemistry: Chemical equilibria and Le Chaterlier's principle and oxidation, reduction and redox equations Organic Chemistry: Alkanes and halogenoalkanes		Physical Chemistry: Acids and bases and electrochemical cells Organic Chemistry: Aromatic chemistry and nitrogen containing compounds	
4	Inorganic Chemistry: Group 2, the alkaline earth metals and Group 7 (17) the halogens Organic Chemistry: Alkenes and alcohols		Organic Chemistry: Amino acids, proteins and DNA and organic synthesis Inorganic chemistry: Transition metals, reactions of ions and properties of group 3 elements and their oxides	
5	Inorganic Chemistry: Periodicity Organic Chemistry: Organic analysis		Exam practice Consolidation of knowledge	
6	Revision over key principles of Chemistry Consolidation of content Start of year 13 content (rate equations and isomerism)			

Exam Board : **AQA**Syllabus N<sup>o</sup> : **7408****Key Stage 5 Physics Programme of Study**

Terms	Year 12	Core	Year 13	Core
1	Measurements and their errors Particles and Radiation Mechanics and Materials		Astrophysics Fields and their consequences	
2	Particles and Radiation Mechanics and Materials		Astrophysics Fields and their consequences	
3	Mechanics and Materials Waves		Astrophysics Fields and their consequences	
4	Mechanics and Materials Waves Electricity		Thermal Physics Nuclear Physics	
5	Electricity Periodic Motion		Exam practice Required practical(s) catch-up and revision	
6	Start Y13 content Astrophysics Fields and their consequences			

Exam Board : **AQA**  
**Level 3**

Syllabus N<sup>o</sup> : 1775

## Key Stage 5 Applied Science Programme of Study

Terms	Year 12	Core	Year 13	Core
1	Unit 1 Key Concepts in Science (examined unit) Unit 2 Applied Experimental techniques (portfolio)		Unit 4 The Human Body (examined unit) Unit 5 Investigating science (portfolio)	
2	Unit 1 Key Concepts in Science (examined unit) Unit 2 Applied Experimental techniques (portfolio)		Unit 4 The Human Body (examined unit) Unit 5 Investigating science (portfolio)	
3	Unit 1 Key Concepts in Science (examined unit) Unit 2 Applied Experimental techniques (portfolio)		Unit 4 The Human Body examination Unit 5 Investigating science (portfolio) Unit 6a Microbiology (portfolio)	
4	Unit 3 Science in the Modern World		Unit 5 Investigating science (portfolio) Unit 6a Microbiology (portfolio)	
5	Preparation for examined units: Unit 1 and unit 3 Exam practice		Preparation for any examined units	
6	Unit 4 The Human Body (examined unit)			