ABEUNT STUDIA IN MORES

Wanstead High School

Education with Character

Science
Curriculum Content 2024 - 25

Key Stage 3 - Year 7, 8 & 9
Key Stage 4 - Year 10 & 11

Contents

Science Year 7

Pupils receive 7 lessons of science each fortnight.

Science at Key Stage 3 is a fundamental pillar of our curriculum, providing pupils with essential knowledge and skills that form the backbone of their educational journey. At this crucial stage, pupils are equipped with the tools to understand and interpret the complex world around them, laying the groundwork for all future scientific learning.

Integrating biology, chemistry, and physics under the guidance of a single teacher enhances a holistic understanding of science. This unified approach allows pupils to see the interconnections between different scientific disciplines, promoting a more comprehensive grasp of each subject. It helps in breaking down the silos that traditionally separate these areas, encouraging pupils to think about science in a more integrated manner. Furthermore, our Key Stage 3 science curriculum is designed to develop 'Education with Character' by fostering resilience and independence. We challenge pupils to think critically and solve problems, skills that are invaluable not just in academic settings but in everyday life. This focus on critical thinking and problem solving prepares pupils to tackle real world challenges with confidence and efficacy.

By the end of Key Stage 3, pupils will have built a solid foundation in scientific knowledge and skills. This preparation is crucial for their success in Key Stage 4 and beyond, ensuring they are well prepared for GCSE examinations and further education. Our approach not only enhances engagement and learning efficiency but also ensures that pupils are ready to meet future academic and career challenges head-on, equipped with a deep and resilient understanding of science.

What is taught	When is it taught (Terms or Half Terms)	Reading list and Literacy focus	Where the curriculum is ambitious
Cells, tissues and organs, the particle model, current and electricity, Sexual reproduction in animals.	**Term 1**	Use the key words from exploring science. Lab safety and introduction to equipment: "Safe Lab: Schools" by Terry J. McGenity Cells, tissues and organs: "Cells Are Us" by Fran Balkwill and Mic Rolph Energy: "Energy: 25 Projects Investigate Why We Need Power & How We Get It" by Kathleen M. Reilly	**Lab Safety and Introduction** to Equipment: Challenge pupils with advanced lab simulations that require problem-solving under pressure. **Cells, Tissues and Organs:** Introduce cutting-edge biotechnology applications and their impact on medicine. **Energy:** Explore emerging renewable energy technologies and their global impact.
7G The Particle model, 7E Mixtures and separation	**Term 2**	Use the key words from exploring science. The Particle model: "Stuff Matters: Exploring the Marvellous Materials That Shape Our Man-Made World" by Mark Miodownik Mixtures and separation: "George's Secret Key to the Universe" by Lucy and Stephen Hawking	The Particle Model: Extend to nanotechnology and its applications in new materials. Mixtures and Separation: Engage in complex separation techniques used in pharmaceuticals.
7J Current and electricity, **7C Muscles and bones**	**Term 3**	Use the key words from exploring science. Current and electricity: "Oscar and the Bird: A Book about Electricity" by Geoff Waring Muscles and bones: "Bones: Skeletons and How They Work" by Steve Jenkins	Current and Electricity: Experiment with circuit designs that solve real-world problems. Muscles and Bones: Discuss bioengineering and prosthetics.

7K Forces, 7F Acids and alkalis	**Term 4**	Use the key words from exploring science. Forces: "Forces and Motion: From Push to Shove" by Paul Fleisher Acids and alkalis: "The Dynamic World of Chemical Reactions with Max Axiom, Super Scientist" by Agnieszka Biskup	Forces: Investigate applications in vehicle safety and sports physics. Acids and Alkalis: Explore pH in environmental contexts.
7D Ecosystems, 7H Atoms, elements and molecules	**Term 5**	Use the key words from exploring science. Ecosystems: "The Magic School Bus on the Ocean Floor" by Joanna Cole Atoms, elements, and molecules: "The Adventures of Adam the Atom" by Casey Waid	Ecosystems: Engage with biodiversity projects and conservation strategies. Atoms, Elements, and Molecules: Explore molecular modelling and chemical bonding.
7L Sound, 7B Sexual reproduction in animals	**Term 6**	Use the key words from exploring science. Sound: "Sound: Loud, Soft, High, and Low" by Natalie M. Rosinsky Sexual reproduction in animals: "It's Not the Stork! A Book About Girls, Boys, Babies, Bodies, Families and Friends" by Robie H. Harris	Sound: Study sound engineering and its applications in music and film. Sexual Reproduction in Animals: Discuss cloning and reproductive technologies.

How are pupils informally and formally assessed?	End of unit tests, including Challenge Weeks Assessment tasks End of year assessments, including Challenge Weeks Retrieval tasks Homework Teacher questioning Work in exercise books
Developing Independent and Home Learning Skills	Online and printed homework All lesson content on the Google Classroom, information and worksheets Exam style practice questions Revision resources
Useful e-Learning Resources (e.g., web links)	https://www.bbc.co.uk/bitesize/subjects/zng4d2p https://senecalearning.com

Equipment for lessons	Black or blue pen, green pen, pencil, rubber, ruler, highlighter, calculator, glue stick.
Enrichment activities	Science competitions and educational visits.
Careers curriculum	STEM Projects

Head of Department and email contact	Mr M Hadden m.hadden@wansteadhigh.co.uk

Science Year 8

Pupils receive 7 lessons of science each fortnight.

Science at Key Stage 3 is a fundamental pillar of our curriculum, providing pupils with essential knowledge and skills that form the backbone of their educational journey. At this crucial stage, pupils are equipped with the tools to understand and interpret the complex world around them, laying the groundwork for all future scientific learning.

Integrating biology, chemistry, and physics under the guidance of a single teacher enhances a holistic understanding of science. This unified approach allows pupils to see the interconnections between different scientific disciplines, promoting a more comprehensive grasp of each subject. It helps in breaking down the silos that traditionally separate these areas, encouraging pupils to think about science in a more integrated manner.

Furthermore, our Key Stage 3 science curriculum is designed to develop 'Education with Character' by fostering resilience and independence. We challenge pupils to think critically and solve problems, skills that are invaluable not just in academic settings but in everyday life. This focus on critical thinking and problem solving prepares pupils to tackle real world challenges with confidence and efficacy.

By the end of Key Stage 3, pupils will have built a solid foundation in scientific knowledge and skills. This preparation is crucial for their success in Key Stage 4 and beyond, ensuring they are well prepared for GCSE examinations and further education. Our approach not only enhances engagement and learning efficiency but also ensures that pupils are ready to meet future academic and career challenges head-on, equipped with a deep and resilient understanding of science.

What is taught	When is it taught (Terms or Half Terms)	Reading list and Literacy focus	Where the curriculum is ambitious
Unicellular organism, the periodic table, light, food and nutrition, metals and their uses, fluids.	**Term 1**	Use the key words from exploring science. Unicellular organisms: "The Invisible ABCs" by Rodney P. Anderson Earth and space: "The Usborne Book of Astronomy & Space" by Lisa Miles and Alastair Smith	Unicellular Organisms: Dive into microbial genetics and biotechnological applications. Earth and Space: Include current space exploration missions and their scientific objectives.
8J Light, **8B Plants and their reproduction**	**Term 2**	Use the key words from exploring science. Light: "Oscar and the Moth: A Book About Light and Dark" by Geoff Waring Plants and their reproduction: "The Magic School Bus Plants Seeds" by Patricia Relf	Light: Study advanced optical systems like lasers and their applications. Plants and their Reproduction: Explore genetic diversity and conservation issues.
8H Rocks, **8G Metals and their uses**	**Term 3**	Use the key words from exploring science. Rocks: "Rocks & Minerals" by Chris Pellant Metals and their uses: "Metals" by John Farndon	Rocks: Explore geological time scales and dating methods. Metals and their Uses: Examine metal recycling and environmental impacts.

8F The periodic table, **8C Breathing and respiration**	**Term 4**	Use the key words from exploring science. The periodic table: "The Elements Book: A Visual Encyclopedia of the Periodic Table" by DK Breathing and respiration: "Lung Function: What Do the Lungs Do" by Ruth Owen	The Periodic Table: Discuss elements' discovery and technological applications. Breathing and Respiration: Link to air quality and respiratory health.
8E Combustion, **8K Energy transfers**	**Term 5**	Use the key words from exploring science. Combustion: "Fire and Combustion" by Chris Woodford Energy transfers: "Energy: Physical Science for Kids" by Andi Diehn	Combustion: Analyse energy production and environmental impacts. Energy Transfers: Explore energy efficiency in homes and industries.
8A Food and Nutrition, **8I Fluids**	**Term 6**	Use the key words from exploring science. Food and Nutrition: "Chew On This: Everything You Don't Want to Know About Fast Food" by Eric Schlosser and Charles Wilson Fluids: "Why Don't Jumbo Jets Flap Their Wings? Flying Animals, Flying Machines, and How They Are Different" by David Alexander	Food and Nutrition: Explore nutritional science and global food security. Fluids: Investigate fluid dynamics in natural and industrial processes.

How are pupils informally and formally assessed?	End of unit tests, including Challenge Weeks Assessment tasks End of year assessments, including Challenge Weeks Retrieval tasks Homework Teacher questioning Work in exercise books
Developing Independent and Home Learning Skills	Online and printed homework All lesson content on the Google Classroom, information and worksheets Exam style practice questions Revision resources
Useful e-Learning Resources (e.g., web links)	**https://www.bbc.co.uk/bitesize/subjects/zng4d2p** **https://senecalearning.com**
Equipment for lessons	Black or blue pen, green pen, pencil, rubber, ruler, highlighter, calculator, glue stick.
Enrichment activities	Science competitions and educational visits.
Careers curriculum	STEM Projects
Head of Department and email contact	Mr M Hadden m.hadden@wansteadhigh.co.uk

Science Year 9

Pupils receive 7 lessons of science each fortnight.

Science at Key Stage 3 is a fundamental pillar of our curriculum, providing pupils with essential knowledge and skills that form the backbone of their educational journey. At this crucial stage, pupils are equipped with the tools to understand and interpret the complex world around them, laying the groundwork for all future scientific learning.

Integrating biology, chemistry, and physics under the guidance of a single teacher enhances a holistic understanding of science. This unified approach allows pupils to see the interconnections between different scientific disciplines, promoting a more comprehensive grasp of each subject. It helps in breaking down the silos that traditionally separate these areas, encouraging pupils to think about science in a more integrated manner. Furthermore, our Key Stage 3 science curriculum is designed to develop 'Education with Character' by fostering resilience and independence. We challenge pupils to think critically and solve problems, skills that are invaluable not just in academic settings but in everyday life. This focus on critical thinking and problem solving prepares pupils to tackle real world challenges with confidence and efficacy.

By the end of Key Stage 3, pupils will have built a solid foundation in scientific knowledge and skills. This preparation is crucial for their success in Key Stage 4 and beyond, ensuring they are well prepared for GCSE examinations and further education. Our approach not only enhances engagement and learning efficiency but also ensures that pupils are ready to meet future academic and career challenges head-on, equipped with a deep and resilient understanding of science.

What is taught	When is it taught (Terms or Half Terms)	Reading list and Literacy focus	Where the curriculum is ambitious
Year 9: plants growth, reactivity, forces and motion, genetics and evolution, making materials, force fields and electromagnets.	**Term 1**	Use the key words from exploring science. **Year 9:** Plant growth: "Botanicum" by Katie Scott and Kathy Willis Reactivity: "Cool Chemistry Concoctions: 50 Formulas that Fizz, Foam, Splatter & Ooze" by Joe Rhatigan and Veronika Alice Gunter Force and motion: "Forces Make Things Move" by Kimberly Brubaker Bradley	**Year 9:** Plant Growth: Incorporate genetic modification and sustainable agricultural practices. Reactivity: Explore industrial chemical processes and their environmental considerations. Force and Motion: Analyse real-world engineering applications of physics.
Year 9: 9A Genetics and evolution, 9E Making materials, 9J Force fields and electromagnets	**Term 2**	Use the key words from exploring science. **Year 9:** Genetics and evolution: "Evolution Revolution" by Robert Winston Making materials: "The Mystery of the Periodic Table" by Benjamin D. Wiker Force fields and electromagnets: "Electricity and Magnets" by Peter Riley	**Year 9:** Genetics and Evolution: Discuss CRISPR and genetic editing technologies. Making Materials: Introduce materials science with a focus on sustainability. Force Fields and Electromagnets: Apply concepts to electromagnetic technologies in transportation.

Year 9: 9D Transition to GCSE, 9H Transition to GCSE, 9L Transition to GCSE	**Term 3**	Use the key words from exploring science. Year 9: Transition to GCSE: "GCSE Science" by CGP Books for a smooth transition and introduction to GCSE topics.	Year 9: Transition to GCSE: Focus on bridging knowledge gaps and introducing GCSE-level challenges.
Year 9: B1 Cell structure and transport, C1 Atomic structure, P1 Conservation and dissipation of energy	**Term 4**	Use the key words from exploring science. Year 9: Cell structure and transport: "The Way We Work: Getting to Know the Amazing Human Body" by David Macaulay Atomic structure: "Understanding Chemistry" by C.N.R. Rao Conservation and dissipation of energy: "Energy: Its Use and the Environment" by Roger A. Hinrichs and Merlin Kleinbach	**Year 9:** Cell Structure and Transport: Examine transport mechanisms in disease contexts. Atomic Structure: Connect with real-world applications in energy. Conservation and Dissipation of Energy: Discuss global energy policy implications.
Year 9: Moved onto the Key Stage 4 curriculum.	**Term 5**	Use the key words from exploring science.	
Year 9: Moved onto the Key Stage 4 curriculum.	**Term 6**	Use the key words from exploring science.	

How are pupils informally and formally assessed?	End of unit tests, including Challenge Weeks Assessment tasks End of year assessments, including Challenge Weeks Retrieval tasks Homework Teacher questioning Work in exercise books
Developing Independent and Home Learning Skills	Online and printed homework All lesson content on the Google Classroom, information and worksheets Exam style practice questions Revision resources
Useful e-Learning Resources (e.g., web links)	**https://www.bbc.co.uk/bitesize/subjects/zng4d2p** **https://senecalearning.com**

Equipment for lessons	Black or blue pen, green pen, pencil, rubber, ruler, highlighter, calculator, glue stick.
Enrichment activities	Science competitions and educational visits.
Careers curriculum	STEM Projects

Head of Department and email contact	Mr M Hadden m.hadden@wansteadhigh.co.uk

GCSE Combined Science - Year 10 and 11

Pupils receive 7 lessons of science a fortnight in Year 10 and 9 lessons, over 2 weeks in Year 11.

The importance of Biology in the curriculum: Studying science is an essential component of our curriculum, influencing various aspects of knowledge and understanding. It equips pupils with the tools to comprehend and interpret the complexities of the world around them, laying the foundation for navigating everyday challenges that require scientific literacy.

Science education encourages the development of Education with Character by fostering resilience, challenging pupils to think critically and independently.

Moreover, studying science cultivates skills such as problem solving, logical reasoning, and analytical thinking, preparing pupils to tackle real-world problems with confidence and efficacy.

Moving away from the previous model of having separate teachers for biology, chemistry, and physics, we now have one teacher instructing pupils across all three disciplines. This change is crucial as it promotes a holistic understanding of science, allowing pupils to see the interconnectedness between different scientific concepts. By teaching all three sciences sequentially, pupils can delve deeper into each subject, building a solid foundation of knowledge.

Overall, this integrated approach enhances engagement, efficiency in teaching, and prepares pupils more effectively for their exams and future endeavours.

What is taught	When is it taught (Terms or Half Terms)	Reading list and Literacy focus	Where the curriculum is ambitious
Cells and organisation	**Term 5 in Year 9**	The Immortal Life of Henrietta Lacks by Rebecca Skloot	In Biology Paper 1, Topics 1 and 2 delve into fundamental concepts such as Cell Biology and Organisation. To infuse ambition into these Topics, we can introduce pupils to advanced research beyond the curriculum. This could involve exploring recent breakthroughs in cell biology, such as CRISPR gene editing or regenerative medicine. Additionally, we can offer opportunities for independent research projects where pupils investigate real-world applications of cellular processes, fostering critical thinking and scientific curiosity. By challenging pupils to engage with cutting-edge science, we aim to inspire a deeper understanding and passion for the subject.
Organisation and Disease	**Term 6 in Year 9**	The Emperor of All Maladies: A Biography of Cancer by Siddhartha Mukherjee	In Biology Paper 1, Topic 3 explores Infection and Response, a crucial area where ambition can be instilled. Beyond the core curriculum, pupils can be exposed to advanced research on infectious diseases, including emerging pathogens and antibiotic resistance. This could involve analysing case studies of global health crises or exploring the development of vaccines and treatments. Furthermore, pupils can engage in debates on ethical considerations surrounding disease control measures or participate in simulations of epidemiological investigations. By delving into complex issues and real-world applications, we aim to cultivate a deeper appreciation for the complexities of microbiology and public health.
Bioenergetics and Atomic structure/periodic table	**Term 1, Year 10**	The Vital Question: Energy, Evolution, and the Origins of Complex Life by Nick Lane and The Disappearing Spoon: And	In Biology Paper 1, Topic 4 delves into Bioenergetics, presenting ample opportunities for ambition. Beyond the standard curriculum, pupils can explore advanced concepts such as metabolic pathways, thermodynamics of cellular processes, and the role of enzymes in energy transfer. Ambitious tasks may include designing experiments to investigate factors affecting enzyme activity or analysing data from biochemical studies. Additionally, pupils can delve into current research on bioenergetics, such as metabolic adaptations in extreme environments or the development of biofuels. By engaging with cutting-edge science, pupils can

		Other True Tales of Madness, Love, and the History of the World from the Periodic Table of the Elements by Sam Kean	develop a deeper understanding of the fundamental processes driving life. In Chemistry Paper 1, Topic 1 covers Atomic Structure and the Periodic Table, offering scope for ambition. Beyond the basic curriculum, pupils can explore the historical development of atomic theory, from Dalton to modern quantum mechanics. Ambitious tasks may include analysing spectroscopic data to determine atomic structure or investigating the properties of elements beyond the periodic table. Furthermore, pupils can explore applications of atomic structure in fields such as nuclear chemistry or materials science, engaging with real-world challenges and innovations. By delving into advanced concepts and applications, pupils can develop a broader appreciation for the role of chemistry in understanding the universe.
Bonding, Structure and the Properties of Matter and Quantitative Chemistry	**Term 2, Year 10**	Naked Chemistry: The Essential Guide for Chemists by Peter Wothers	In Chemistry Paper 1, Topics 2 and 3 cover Bonding, Structure, and the Properties of Matter, as well as Quantitative Chemistry. These Topics offer ample opportunities for ambition and challenge. Beyond the core curriculum, pupils can explore advanced concepts such as molecular orbital theory, intermolecular forces, and the relationship between structure and properties of materials. Ambitious tasks may include designing experiments to investigate the effect of bonding on physical properties or analysing data from chemical reactions to determine reaction kinetics and stoichiometry. Furthermore, pupils can explore applications of quantitative chemistry in areas such as environmental analysis or pharmaceutical development, engaging with real-world problems and innovations. By delving into advanced concepts and applications, pupils can develop a deeper understanding of the principles that govern chemical behaviour and its practical implications.
Chemical Changes and Energy	**Term 4, Year 10**	Chemical Reactions (Material Matters) by Christopher Cooper	In Chemistry Paper 1, Topic 4 explores Chemical Changes, where opportunities for ambition and challenge abound. Beyond the standard curriculum, pupils can delve into more complex chemical reactions, such as redox reactions and acid-base titrations, exploring their mechanisms and applications in industry and environmental science. Ambitious tasks may involve designing investigations to optimise reaction conditions or analysing chemical processes in biological systems. Furthermore, pupils can explore cutting-edge research in areas like catalysis and green chemistry, gaining insights into current scientific advancements and their implications for sustainability and innovation. In Physics Paper 1, Topic 1 covers Energy, where ambition can be infused to stretch pupils further. Beyond the basic concepts, pupils can explore advanced Topics such as energy transfer mechanisms, efficiency calculations, and energy conservation principles. Ambitious tasks may include designing experiments to investigate energy transformations in different systems or analysing energy diagrams to understand complex processes like nuclear fission and fusion. Furthermore, pupils can explore interdisciplinary applications of energy concepts, such as renewable energy technologies and their role in addressing global energy challenges. By engaging with advanced concepts and real-world applications, pupils can develop a deeper understanding of energy principles and their significance in modern society.

Electricity and Particle model of matter	**Term 5, Year 10**	Stuff Matters: Exploring the Marvellous Materials That Shape Our Man-Made World by Mark Miodownik	In Physics Paper 1, Topic 2 delves into Electricity, offering ample opportunities to infuse ambition and challenge into the curriculum. Beyond the basics of circuits and electrical components, pupils can explore advanced concepts such as electromagnetism, electrical power, and electrical safety regulations. Ambitious tasks may involve designing and building complex circuits to achieve specific functions or investigating the applications of electricity in industries like telecommunications and electronics. Furthermore, pupils can explore emerging technologies such as renewable energy systems and electric vehicles, gaining insights into the future of energy production and consumption. Moving on to Topic 3, the Particle Model of Matter, pupils can be challenged to explore the microscopic world in depth. Beyond the fundamentals of particle behaviour, pupils can investigate advanced Topics such as kinetic theory, phase transitions, and the behaviour of gases under different conditions. Ambitious tasks may include designing experiments to explore the relationship between temperature and pressure in gases or analysing data to understand the properties of materials at the atomic level. Furthermore, pupils can explore cutting-edge research in areas like nanotechnology and quantum mechanics, gaining insights into the forefront of scientific exploration and its potential applications in technology and industry. By engaging with advanced concepts and real-world applications, pupils can develop a deeper understanding of the fundamental principles that govern the behaviour of matter.
Atomic structure and Homeostasis	**Term 6, Year 10**	The Body Keeps the Score: Brain, Mind, and Body in the Healing of Trauma by Bessel van der Kolk	In Physics Paper 1, Topic 4, Atomic Structure, pupils can be challenged to explore the intricate details of the atom and its constituents. Beyond the basics of atomic structure, pupils can delve into advanced concepts such as isotopes, electron configuration, and nuclear reactions. Ambitious tasks may involve investigating the properties of different elements and their isotopes or exploring the applications of nuclear physics in medicine, energy production, and environmental science. Furthermore, pupils can engage with cutting-edge research in particle physics, gaining insights into the fundamental building blocks of the universe and the mysteries of the subatomic world. In Biology Paper 2, Topic 5, Homeostasis, pupils can be challenged to explore the complex mechanisms that maintain internal balance in living organisms. Beyond the basics of homeostatic control systems, pupils can investigate advanced Topics such as feedback mechanisms, hormonal regulation, and the role of homeostasis in health and disease. Ambitious tasks may include designing experiments to investigate the effects of external stimuli on physiological processes or analysing data to understand the relationship between homeostasis and various health conditions. Furthermore, pupils can explore interdisciplinary connections between homeostasis and other biological processes, such as metabolism, reproduction, and immune function, gaining a holistic understanding of the interconnected nature of living systems. By engaging with advanced concepts and real-world applications, pupils can develop a deeper appreciation for the complexity and resilience of living organisms.

Inheritance, Variation and Evolution and Ecology	**Term 1, Year 11**	The Selfish Gene by Richard Dawkins	In Biology Paper 2, Topics 6 and 7, pupils have the opportunity to explore two crucial areas: Ecology and Inheritance, Variation, and Evolution. For Topic 6, Ecology, pupils can be challenged to understand the intricate relationships between organisms and their environment. Ambitious tasks may involve investigating complex ecosystems and analysing the impact of human activities on biodiversity. Pupils can explore advanced ecological concepts such as succession, nutrient cycling, and population dynamics. Additionally, they can engage in fieldwork opportunities to collect data and develop their investigative skills. By studying ecology in depth, pupils gain a deeper appreciation for the interconnectedness of life on Earth and the importance of environmental stewardship. Moving on to Topic 7, Inheritance, Variation, and Evolution, pupils can explore the mechanisms of heredity and the processes that drive evolutionary change. Ambitious tasks may involve investigating genetic mutations, genetic disorders, and the role of natural selection in shaping biodiversity. Pupils can analyse real-world data sets to study patterns of inheritance and the evolutionary relationships between species. Furthermore, they can explore contemporary issues in genetics and evolution, such as genetic engineering and antibiotic resistance. By grappling with these complex Topics, pupils develop critical thinking skills and a deeper understanding of the mechanisms that underpin biological diversity and adaptation.
The Rate and Extent of Chemical Change and Organic Chemistry	**Term 2, year 11**	Organic Chemistry: A Very Short Introduction by Graham Patrick	In Chemistry Paper 2, Topics 6 and 7 cover Rates of Reaction and Organic Chemistry, respectively. For Topic 6, Rates of Reaction, pupils can be challenged to explore the factors affecting the speed of chemical reactions and the methods used to measure reaction rates. Ambitious tasks may involve designing and conducting experiments to investigate the effect of concentration, temperature, and surface area on reaction rates. Pupils can analyse experimental data to draw conclusions and identify patterns, developing their analytical and investigative skills. Furthermore, they can explore advanced concepts such as reaction mechanisms and the role of catalysts in accelerating reactions. By delving into the intricacies of reaction kinetics, pupils gain a deeper understanding of chemical processes and their practical applications. Moving on to Topic 7, Organic Chemistry, pupils can explore the vast and diverse world of organic compounds and their reactions. Ambitious tasks may involve synthesising organic molecules through multi-step reactions and analysing their structures using spectroscopic techniques. Pupils can investigate functional groups, isomerism, and stereochemistry, gaining insight into the complexity of organic molecules and their role in biological systems. Furthermore, they can explore contemporary Topics such as green chemistry and sustainable synthesis methods. By engaging with organic chemistry at an advanced level, pupils develop problem-solving skills and a deeper appreciation for the importance of organic compounds in everyday life and industry.

Chemical Analysis **Chemistry of the Atmosphere** **Using Resources**	**Term 3, Year 11**	"The Sixth Extinction: An Unnatural History by Elizabeth Kolbert	In Chemistry Paper 2, Topics 8, 9, and 10 encompass Chemical Analysis, Chemistry of the Atmosphere, and Using Resources, respectively. For Topic 8, Chemical Analysis, pupils can be challenged to explore advanced analytical techniques used to identify and quantify substances. Ambitious tasks may involve conducting complex titrations, spectroscopic analyses, or chromatographic separations to determine the composition of unknown samples. Pupils can interpret experimental data, draw conclusions, and evaluate the reliability of their results, developing critical thinking and problem-solving skills. Furthermore, they can explore cutting-edge analytical methods such as mass spectrometry and nuclear magnetic resonance spectroscopy, gaining insight into their applications in forensic science, environmental monitoring, and pharmaceutical analysis. Moving on to Topic 9, Chemistry of the Atmosphere, pupils can delve into the complex interactions that govern Earth's atmosphere and climate. Ambitious tasks may involve analysing atmospheric data to understand the causes and consequences of air pollution, climate change, and ozone depletion. Pupils can explore the chemistry behind phenomena such as acid rain formation, greenhouse gas emissions, and stratospheric ozone chemistry, gaining a deeper understanding of their environmental impact. Furthermore, they can investigate strategies for mitigating atmospheric pollution and promoting sustainable development, engaging with interdisciplinary concepts in environmental science and policy. Finally, in Topic 10, Using Resources, pupils can explore the principles of sustainable resource management and the chemistry behind industrial processes. Ambitious tasks may involve analysing life cycle assessments to evaluate the environmental impact of resource extraction, processing, and disposal. Pupils can investigate the chemistry of key industrial processes such as Haber process for ammonia production, contact process for sulfuric acid manufacture, and electrolysis for aluminium extraction, gaining insight into their efficiency, sustainability, and societal implications. Furthermore, they can explore emerging technologies and green chemistry principles to develop innovative solutions for resource conservation and waste reduction. By engaging with these Topics, pupils develop a holistic understanding of the role of chemistry in shaping our interactions with the environment and society.
Forces	**Term 4, Year 11**	Forces of Nature by Brian Cox and Andrew Cohen	To infuse ambition into this Topic, pupils can be challenged with advanced applications and real-world scenarios that extend beyond basic concepts. Ambitious tasks may involve analysing complex force diagrams in three dimensions, considering the effects of friction, tension, and air resistance in dynamic situations. Pupils can explore advanced Topics such as moments, equilibrium, and resultant forces, applying mathematical modelling to solve problems involving multiple interacting forces. Furthermore, pupils can investigate the role of forces in engineering and technology, exploring applications in areas such as structural design, transportation, and biomechanics. Ambitious projects may involve designing and testing prototypes for structures or devices that optimise force distribution, minimise energy consumption, or enhance

			performance. By engaging with these Topics, pupils develop critical thinking skills and problem-solving abilities while gaining insight into the practical applications of physics in various fields.
Waves, Magnetism and Electromagnetism	**Term 5, Year 11**	Six Easy Pieces: Essentials of Physics Explained by Its Most Brilliant Teacher by Richard P. Feynman	In Physics Paper 2, Topics 6 and 7 cover Waves and Electromagnetism, respectively. To introduce ambition into these Topics, pupils can be presented with challenging concepts and practical applications that extend beyond the basic curriculum. For Waves (Topic 6), ambitious tasks may include exploring advanced wave phenomena such as interference, diffraction, and standing waves. Pupils can investigate the principles of wave behaviour in different mediums and analyse complex wave interactions. Ambitious projects may involve designing experiments to demonstrate wave properties or researching cutting-edge technologies that rely on wave phenomena, such as medical imaging techniques or telecommunications systems. In Electromagnetism (Topic 7), pupils can be challenged to explore the deeper principles underlying electromagnetic phenomena. Ambitious tasks may involve studying electromagnetic induction, electromagnetic waves, and the relationship between electricity and magnetism. Pupils can investigate real-world applications of electromagnetism, such as generators, motors, and electromagnetic radiation. Ambitious projects may include designing and building electromechanical devices or investigating the role of electromagnetic fields in modern technologies such as wireless communication and renewable energy systems. By engaging with these ambitious tasks, pupils develop a deeper understanding of the fundamental principles of physics and gain insight into the diverse applications of waves and electromagnetism in science and technology.
Revision and exams	**Term 6, Year 11**		

How are pupils informally and formally assessed?	Fortnightly tests Challenge week assessments End of year assessments, including Challenge Weeks In lesson exam questions Homework Teacher questioning Work in exercise books
Developing Independent and Home Learning Skills	“Prep booklet” - a booklet containing exam questions which help pupils prepare for the fortnightly test at Key Stage 4. The use of online learning platforms such as Oak national academy and YouTube channels such as: Cognito.edu, Fuse School and free science lessons.
Useful e-Learning Resources (e.g., web links)	https://www.physicsandmathstutor.com/ - Physics and Maths Tutor https://www.bbc.co.uk/bitesize/examspecs/zpgcbk7 - Triple Biology https://www.bbc.co.uk/bitesize/Topics/zthssrd - Combined Biology https://senecalearning.com/en-GB/blog/gcse-biology-revision/ - Seneca

Equipment for lessons	Black or blue pen, green pen, pencil, rubber, ruler, highlighter, calculator, glue stick.
Enrichment activities	Research tasks and after school activities.
Careers curriculum	NHS cadets after school once a week for 39 weeks.

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