



## Our curriculum in Science

What is the purpose of Science	Department information
<p>The core purpose and ambition of the Arthur Terry Science curriculum is to provide a high quality education that transforms the life chances of all of our students, particularly those with SEND and who are socially disadvantaged, through a ‘knowledge engaged’ curriculum. A high-quality science education will help pupils gain a coherent knowledge and understanding that will enable students to make informed decisions in their life. It should inspire pupils’ curiosity to know more about the science and technology. Teaching should equip pupils to assess risks, think critically, weigh evidence, and develop understanding of the increasingly technological world we live in. Our curriculum will seek to provide all with the foundation of scientific understanding and transferable skills to succeed once they have left school.</p>	<p>Core Leader: Anna Haslam            Deputy Core Leader: Abbie Gray            Subject Leaders:            KS3: Sarah Sinclair            Biology: Kat Taylor            Chemistry: Kaylee Ward            Physics: Mark Prince</p> <p>Exam board: AQA for GCSE Sciences, A level Chemistry and Physics and OCR for A level Biology</p>
How do we develop Arthur Terry Learners?	
<p><b>Resilience</b>            Our science curriculum allows students many opportunities practise and demonstrate perseverance, focus, dedication, and resilience. Our students are encouraged to learn from mistakes in a safe and supportive learning environment, centred around our curriculum.</p> <p><b>Active Approach</b>            Throughout our curriculum, students are encouraged to take ownership of their own learning, through contribution of ideas, actively participating in lessons and listening and learning from the opinions and experiences of others.</p> <p><b>Values</b>            Our curriculum is delivered to promote and uphold values and we have high expectations of our students in science. Examples of this include kindness, helpfulness, pride, effort, respect, and inclusivity.</p> <p><b>Meta-Cognition</b>            Our curriculum provides regular opportunities for students to reflect and upgrade their work through identifying their strengths and weaknesses. Our curriculum is embedded with opportunities for students to apply their knowledge.</p> <p><b>Preparation</b>            The high standards we set within our curriculum and lessons promote and support students with their organisation, punctuality, and meeting targets. Our curriculum is embedded with approaches to aid students to plan for written and practical work.</p>	



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	Topics/Units	Summary of key content
7	<ul style="list-style-type: none"> <li>○ Cells and organisation</li> <li>○ Variation and reproduction</li> <li>○ Interdependence</li> <li>○ Particles</li> <li>○ Separation techniques</li> <li>○ Chemical reactions</li> <li>○ Forces</li> <li>○ Energy 1</li> <li>○ Electricity and magnetism</li> </ul>	<p>Students are introduced to, (and build upon from KS2), the fundamental concepts of biology, chemistry and physics which help them to understand the world around them.</p> <p>This includes learning about their cells and organs, puberty and sexual intercourse, food chains and animal/plant adaptation in biology. In chemistry, students will learn about particles, states of matter and the atom, different substances and techniques to separate them and they will study the theory of a number of chemical reactions and will carry out a number of chemical reactions in the laboratory. In physics students will explore the forces present in our universe and how these affect different objects and they will learn about different energy stores and transfers. Students will investigate electricity and circuits and have an introduction to magnetism.</p> <p>Students will develop their understanding of the scientific method and laboratory safety and will be supported to develop their practical skills throughout these units of work.</p>
8	<ul style="list-style-type: none"> <li>○ Nutrition, digestion and drugs,</li> <li>○ Bioenergetics</li> <li>○ Genetics and Evolution</li> <li>○ The periodic table</li> <li>○ Chemical reactions</li> <li>○ Earth and Atmosphere</li> <li>○ Forces 2</li> <li>○ Energy 2</li> </ul>	<p>Students will build upon and use their knowledge from the year 7 curriculum and be introduced to new concepts in year 8 science. Students will carry out and observe practical science to develop their practical skills and support their learning.</p> <p>In Biology they will cover nutrition, digestion and the effect of some legal and illegal drugs. The bioenergetics unit will cover the circulatory system, the respiratory system and photosynthesis. In the Genetics and Evolution topic students will study content including the</p>



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	<ul style="list-style-type: none"> <li>○ Waves</li> </ul>	<p>theory of evolution, inheritance and DNA.</p> <p>In Chemistry students will learn about the development of the periodic table and how the modern periodic table is designed, they will explore the theory of and carry out more chemical reactions. The Earth and Atmosphere unit will cover topics including the structure of the Earth, the composition of the atmosphere and climate change. In Physics students will further explore Forces and Energy to build on their prior knowledge in addition to the 'Waves' unit of work where they will look in more detail at light and sound waves.</p>
<p>9</p>	<ul style="list-style-type: none"> <li>○ Biology               <ul style="list-style-type: none"> <li>○ Ecology</li> <li>○ Infectious Diseases</li> <li>○ Cells, Organisation and Exchange</li> </ul> </li> <li>○ Chemistry               <ul style="list-style-type: none"> <li>○ Fundamentals of Chemistry</li> <li>○ Rates of reaction</li> <li>○ The atmosphere, crude oil and polymers</li> </ul> </li> <li>○ Physics               <ul style="list-style-type: none"> <li>○ Energy</li> <li>○ Kinetic Theory &amp; Density</li> <li>○ Radioactivity</li> <li>○ Energy Resources</li> </ul> </li> </ul>	<p>In Year 9 students will be building upon their prior learning and be introduced to a number of new topics. They will have specialist teachers for the three different science areas.</p> <p>They will further develop their understanding of systems and processes in the human body and the interdependence of organisms in ecosystems in the Biology units.</p> <p>They will be introduced to new contexts and uses for their existing knowledge of chemistry in looking at the practical aspect of reaction rates and reactions that involve the gases in the atmosphere, pollution, oil and plastics.</p> <p>In their Physics lessons they will be exploring the key concept of energy, including stores and sources and the application of particles to radioactivity and density.</p>
<p>10</p>	<ul style="list-style-type: none"> <li>○ Biology               <ul style="list-style-type: none"> <li>○ Plants and Photosynthesis</li> <li>○ Infection</li> <li>○ Nerves, Hormones and Homeostasis</li> </ul> </li> <li>○ Chemistry               <ul style="list-style-type: none"> <li>○ Rates of reaction</li> <li>○ Structure and bonding</li> </ul> </li> </ul>	<p>All students will study Biology, Chemistry and Physics topics. The number and depth of these topics will depend on the pathway chosen.</p> <p>In depth detail of the content of each unit can be found</p>



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	<ul style="list-style-type: none"> <li>○ Metal extraction and electrolysis</li> <li>○ Energy changes</li> <li>○ Earth's resources</li> <li>○ Physics             <ul style="list-style-type: none"> <li>○ Waves</li> <li>○ Electricity</li> <li>○ Forces</li> </ul> </li> </ul>	<p>here</p> <p><a href="https://www.aqa.org.uk/subjects/science/gcse/combined-science-trilogy-8464/specification-at-a-glance">https://www.aqa.org.uk/subjects/science/gcse/combined-science-trilogy-8464/specification-at-a-glance</a></p> <p>or here for Separate Sciences</p> <p><a href="https://www.aqa.org.uk/subjects/science/gcse">https://www.aqa.org.uk/subjects/science/gcse</a></p>
<p><b>11</b></p>	<ul style="list-style-type: none"> <li>○ Biology             <ul style="list-style-type: none"> <li>○ Variation and Inheritance</li> <li>○ Exchange (Separates only)</li> <li>○ Transport and Homeostasis</li> <li>○ Environment and Biotechnology (Separates only)</li> </ul> </li> <li>○ Chemistry             <ul style="list-style-type: none"> <li>○ Acids and bases</li> <li>○ Calculations</li> <li>○ Energy changes</li> <li>○ Earth's resources</li> <li>○ Separates chemistry content in the above topics</li> </ul> </li> <li>○ Physics             <ul style="list-style-type: none"> <li>○ Forces</li> <li>○ Magnetism</li> <li>○ Induction, Fission Fusion, Fields, Pressure, Space Physics (Separates only)</li> </ul> </li> </ul>	<p>All students will study Biology, Chemistry and Physics topics. The number and depth of these topics will depend on the pathway chosen.</p> <p>In depth detail of the content of each unit can be found here</p> <p><a href="https://www.aqa.org.uk/subjects/science/gcse/combined-science-trilogy-8464/specification-at-a-glance">https://www.aqa.org.uk/subjects/science/gcse/combined-science-trilogy-8464/specification-at-a-glance</a></p> <p>or here for Separate Sciences</p> <p><a href="https://www.aqa.org.uk/subjects/science/gcse">https://www.aqa.org.uk/subjects/science/gcse</a></p>
<p><b>12 and 13</b></p>	<ul style="list-style-type: none"> <li>○ Biology             <ul style="list-style-type: none"> <li>○ Module 1: Development of Practical Skills</li> <li>○ Module 2: Foundations in Biology</li> <li>○ Module 3: Exchange and transport</li> <li>○ Module 4: Biodiversity, evolution and disease</li> </ul> </li> </ul>	<p>A level Biology studies animals and plants at greater depth than at GCSE. Students are expected to do more independent learning than before. Practical work is an integral part of the course and students learn to think critically about aspects of Biology that impinge on everyday life. These areas include Cell structure, Biological molecules, Nucleotides and nucleic acids, Enzymes, Biological membranes, Cell</p>



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- Module 5: Communication, homeostasis and energy
- Module 6: Genetics, evolution and ecosystems
- Chemistry
  - Physical Chemistry
  - Organic Chemistry
  - Inorganic Chemistry
- Physics
  - Component 1: Measurements and their errors
  - Component 2: Particles and radiation
  - Component 3: Waves
  - Component 4: Mechanics and materials
  - Component 5: Electricity, Current electricity
  - Component 6.1: Periodic Motion
  - Component 6.2: Thermal Physics
  - Component 7: Fields and their consequences
  - Component 8: Nuclear physics
  - Component 9: Astrophysics

division, cell diversity and cellular organisation, Exchange surfaces, Transport in animals and plants, Communicable diseases, disease, Prevention and the immune system, Biodiversity, Classification and evolution, Communication and homeostasis, Excretion as an example of homeostatic control, Neuronal communication, Hormonal communication, Plant and animal responses, Photosynthesis, Respiration, Cellular control, Patterns of inheritance, Manipulating genomes, Cloning and biotechnology, Ecosystems and Populations and sustainability

An A level in Chemistry provides students with a range of transferable skills and develops their ability to apply knowledge to new problems. The course is challenging and aims to give students the opportunity to develop their understanding of Chemistry concepts. The aims of A level Chemistry are to : Develop students independent study skills, To familiarise students with experimental techniques, To provide students who wish to continue studying Science with a firm foundation of Chemistry concepts. The content covered includes aspects of physical chemistry encompassing Bonding, Thermodynamics, Kinetics and Equilibria. Inorganic Chemistry including Periodicity, Electrochemistry and Study of the Transition Metals. Organic Chemistry and the reactions of various homologous series, Organic synthesis and Chemical analysis

The Chemistry course has a large practical element with a minimum of twelve required practical tasks throughout the two year course including the skills of planning, implementing, analysis and evaluation

A level Physics will develop in-depth knowledge and understanding of the principles of Physics, gain hands-on practical skills and data analysis skills, appreciate How Science Works and its relevance



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beyond the laboratory, see how Physics links to other sciences and how the subject underpins important technologies.

The topics studied include Use of SI units and their prefixes, Limitation of physical measurements, Estimation of physical quantities. Constituents of the atom, stable and unstable nuclei, particles, antiparticles and photons, particle interactions, classification of particles, quarks and antiquarks, applications of conservation laws Electromagnetic radiation and quantum phenomena, the photoelectric effect, collisions of electrons with atoms, energy levels and photon emission, wave-particle duality Progressive and stationary waves, principle of superposition of waves and formation of stationary waves, refraction, diffraction and interference, Force, energy and momentum, scalars and vectors, moments, motion along a straight line, projectile motion, Newton's laws of motion, momentum, work, energy and power, conservation of energy. Materials, Bulk properties of solids The Young modulus Current electricity, basics of electricity, current-voltage characteristics, resistivity, circuits, potential divider, electromotive force and internal resistance Circular motion, Simple Harmonic Motion (SHM), simple harmonic systems, forced vibrations and resonance Thermal energy transfer, ideal gases, molecular kinetic theory model Gravitational fields, electric fields, capacitance, magnetic fields Radioactivity, nuclear instability, nuclear energy Telescopes, classification of stars, cosmology

All Science specifications ensure that students who have a good Science GCSE background will be able to successfully understand wider aspects of the subject with ease.



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All students will study Biology, Chemistry and Physics topics. The number and depth of these topics will depend on the pathway chosen.

The Core Science pathway results in two GCSE qualifications in Science that include Biology, Chemistry and Physics topics. The Separate Sciences pathway results in students achieving one GCSE in each area of Biology, Chemistry and Physics. Both courses involve extensive practical work including specific experiments that students are expected to have completed. Students will develop a range of investigative skills. Both pathways allow for study of Science at A level and Post-16.