

Science (Years 7 - 11)

Overview of the Curriculum

Years 7 & 8

The Science curriculum in Years 7 & 8 covers the content from the Science Key Stage 3 National Curriculum. The National Curriculum provides students with a strong foundation of scientific knowledge and skills, but within the context of Parmiter's this material is covered in Years 7 & 8. This provides students the opportunity to move on to topics within the GCSE Science courses in Year 9, deepening their understanding of areas already covered in Years 7 & 8 as well as being introduced to some new topic areas.

The first unit of work for all Year 7 students is an introductory module that introduces them to working safely in the Science Laboratories. Some key aspects of practical work, for example, considering your variables and method, recording your data and writing a conclusion, are also covered in this unit.

For the remainder of Years 7 & 8, students study units in each of the science disciplines: Biology, Chemistry & Physics. These are studied on rotation, but our carefully ordered teaching plans and schemes of work ensure that learning builds sequentially. Across each year, all students will study the content in each of the science disciplines in the same order. Where knowledge or skills sit across different units, our schemes of work ensure they are taught within the scientific discipline first studied by the student. Whilst the context of learning and developing a specified skill may be different within units, the skill itself can then be applied in a different scientific discipline in a future rotation.

Our experienced subject specialist teachers ensure that breadth and depth of understanding is developed. This may be through students being encouraged to think critically and developing the key skills of effective scientific inquiry, or by teachers presenting additional material that enriches students' experience of a topic.

Practical work is embedded across the Year 7 & 8 schemes of work. Our aim is that students understand the importance of practical work in constructing and testing scientific theories. Practical lessons are planned to allow students to experience the theoretical knowledge learned, to develop students' practical skills and to build their confidence in the laboratories. In Year 7, practical work focuses on using scientific equipment safely and accurately and introducing a range of experimental techniques. In Year 8, students are expected to build on these foundations, evaluating techniques and approaches they use in practical sessions and moving towards independently planning practicals. Students only rarely write up a full practical; instead the outcome of practical lessons focuses on one or two key skills to ensure these are explored in sufficient depth. For example, a given practical may focus on the skills of data recording and analysis, whereas another practical may focus on writing a conclusion and evaluating the practical.

Whilst students are developing a secure knowledge and skill base across all the scientific disciplines, they are taught in mixed ability classes.

Science GCSE - Years 9, 10 & 11

Students cover the Science Key Stage 3 National Curriculum during their studies in Years 7 and 8. This provides the opportunity for students to start studying the topics covered in the GCSE specification in Year 9. At GCSE there are two routes (commonly referred to as Triple Science or Double Science) available to students, however, in Year 9 all students study the same topics and decisions about which route to follow at GCSE are only made at the end of Year 9.

Parmiter's Science faculty follows the AQA GCSE courses. We believe that the AQA courses in Science effectively build students' knowledge and skills in a sequential manner, suiting students of all abilities. The AQA courses are also planned to allow our students to move between pathways, ensuring flexibility as students move through the course. Both pathways, Triple or Double Science, give opportunity for progression to A Level Science.

The topics taught in Year 9 link to those met during Years 7 & 8, thus ensuring a smooth transition to GCSE work. Key topic knowledge is reviewed before students move on to the more challenging content required at GCSE level. Students continue to develop their practical skills, focusing on the understanding of scientific method, evaluating data and analysing the confidence in conclusions drawn from practical work. In Year 9, students are taught in broad academic sets based on performance in key assessments. This ensures lessons provide the appropriate level of support and challenge and all students make a positive start to the GCSE content.

Having experienced GCSE content in Year 9, informed decisions about the appropriate GCSE Science pathway are made before the start of Year 10. The two pathways at GCSE Science are:

- Triple Science, where students sit a GCSE qualification in each of Biology, Chemistry and Physics.
- Double Science (called Combined Science by the examination boards), where students study and sit examinations in Biology, Chemistry and Physics topics, but they are awarded two GCSE grades that reflect their performance across three science disciplines.

From Year 10, students are taught in academic sets within each of the Science pathways. All students have the same curriculum time for Science, irrespective of their pathway. Although the greater content of the Triple Science pathway means material on this course is covered more quickly, Triple Science is studied by students with an aptitude and interest in Science and the pace of learning suits these classes. For students studying Double Science, the curriculum time allows thorough coverage of content and the opportunity to provide enrichment opportunities for those that have mastered the curriculum material. For each pathway, the examination board (AQA) offers two tiers of entry, Foundation or Higher. Students studying the Triple Science course are entered for the Higher Tier examinations. Those on the Double Science course may be entered for either the Foundation Tier or the Higher Tier; decisions on tiers of entry are usually made early in the Spring Term of Year 11.

The content covered in Years 10 & 11 is largely determined by AQA, although learning often extends beyond the scope of the specification to stretch students and inspire them to study Science post GCSE. Although only a topic within the Triple Science course,

all students study a module on Space as this is an area of Science we have found the vast majority of students find interesting and want to continue to study beyond that taught in Year 7 or 8. Where appropriate, the learning is contextualised so the content is engaging and relevant to students.

Learning across Year 10 and 11 is sequenced to build cumulatively through the course and, where relevant, learning is explicitly linked to knowledge and skills developed in previous units. The order of topics is carefully considered to allow students to draw on secure foundations in order to access the more difficult content.

SMSC in Science

Spiritual development in Science is promoted by encouraging students to reflect on the awe and wonder of the natural world, the universe and life itself. Students are given opportunities to consider the origins of life, the complexity of living organisms and the vastness of space - prompting curiosity, reflection and a sense of place in the wider universe. Science fosters a questioning mindset, inspiring students to seek understanding and meaning in the natural phenomena they observe. Investigating scientific ideas can encourage students to consider philosophical questions about existence, consciousness and human responsibility.

Moral development in Science involves students considering the ethical implications of scientific discoveries and technological advancements. Topics such as genetic engineering, climate change, medical research and the use of finite resources prompt students to examine the responsibilities scientists and society hold in decision-making. Students learn to weigh evidence, consider opposing viewpoints and understand the consequences of actions on people, animals and the environment. Science encourages respect for truth, integrity in experimentation and accountability in the application of knowledge.

Social development in Science is fostered through collaborative investigations, group discussions and shared practical tasks. Students develop teamwork, communication and problem-solving skills by working together to plan and carry out experiments or analyse data. The subject also encourages students to reflect on how scientific developments impact society, healthcare, industry and daily life. By understanding the role science plays in social progress and global challenges, students become more informed, responsible citizens capable of contributing to informed debate.

Cultural development in Science involves exploring how scientific discoveries and theories have emerged in different cultures and historical periods. Students are introduced to scientists from diverse backgrounds and cultures, highlighting the global and inclusive nature of scientific endeavour. Understanding how science is influenced by and influences culture, politics and religion supports students in developing respect for diverse perspectives. Students also explore the cultural and societal changes brought about by technological innovation and how science continues to shape modern life across the world.

Examples of Spiritual, Moral, Social and Cultural development in Science include:

- Reflecting on the complexity and beauty of the universe, ecosystems or the human body to inspire spiritual curiosity.

- Debating ethical issues such as cloning, animal testing, vaccination, energy resources or space exploration.
- Working collaboratively on practical experiments, learning to share resources, ideas and responsibilities.
- Investigating the impact of scientific discoveries in different historical and cultural contexts, such as Discovery of vaccines, Chinese medicine, or Indigenous ecological knowledge.
- Discussing the role of science in solving global problems like climate change, clean water access and food security.
- Learning about and opportunities to research key scientific figures from a range of backgrounds, such as Marie Curie, Charles Darwin, Isaac Newton, JJ Thompson, Niels Bohr, Dimitri Mendeleev, Max Planck, John Newlands, Ernest Rutherford, Alexander Fleming, Ignaz Semmelweis, Gregor Mendel, Diane Fossey, Jane Goodall, Rosalind Franklin and Alfred Wallace.

Overview of schemes of work at each key stage

Years 7 & 8 The topics covered in Years 7 and 8 are: Year 7 • Introduction to practical skills <u>Biology</u> Year 7 • Cells and organisation • Reproduction and development • Photosynthesis and ecosystems Year 8 • Nutrition, digestion and health • Respiration and gas exchange • Inheritance and genetics <u>Chemistry</u> Year 7 • Atoms, elements and compounds • Acids and alkalis	Key Stage 4 The topics covered in Years 9 and 11 include: Biology • Cells and organisation • Disease and bioenergetics • Biological responses • Genetics and reproduction • Ecology Chemistry • Atoms, bonding and moles • Chemical reactions and energy changes • Rates, equilibrium and organic chemistry • Analysis and the Earth's resources Physics • Energy and energy resources • Particles at work • Forces in action • Waves, electromagnetism and space
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Year 8

- Earth and the atmosphere
- Metals and reactivity
- Chemical energy
- Analysis and practical skills

Physics**Year 7**

- Particle theory
- Space
- Energy

Year 8

- Electricity and electromagnetism
- Forces
- Light and sound

Working Scientifically

Through practical work, supported by relevant theory, students are taught the skills of working scientifically. As they move through Years 7 and 8, students should become increasingly confident and independent in their ability to:

- Evaluate risks
- Make predictions
- Plan investigations to answer questions
- Obtain reliable results using a range of equipment
- Suggest improvements to a method which would increase the accuracy of results
- Record their observations and/or collect data
- Present their data using an appropriate method
- Draw conclusions and offer explanations
- Evaluate data and identify potential sources of error
- Apply mathematical concepts and calculate results
- Understand and use SI units
- Use simple equations to carry out calculations.

Practical techniques are embedded throughout the scheme of work. Numerical skills are built on from Key Stage 3, including arithmetic and numerical computation, handling data, algebra, graphs, geometry and trigonometry. Students' scientific literacy is developed over the three disciplines.