



Meridian
Trust

Curriculum Overview Science



Curriculum Overview

Key Stage 3

Curriculum Aims

Our KS3 curriculum nurtures and develops the inherent scientific curiosity and enthusiasm that students join us with. Through the lens of big ideas and using mastery goals, our lessons challenge misconceptions, develop practical skills and lay the foundation for further study and the ability to engage meaningfully with scientific concepts in the wider world.

Science capital, including the wide diversity of contributors to scientific knowledge, is built through the units of learning and extra-curricular opportunities, including cross-Trust science events.

Our KS3 curriculum connects concepts and theories across biology, chemistry and physics to assist students in building their scientific schema. Its spiral design ensures that core disciplinary knowledge is revisited, refined and easily retrieved.



Key Curriculum Content

Across year 7 and 8 pupils will be taught all three science disciplines:

Biology

- Structure and Function of living organisms
- Material cycles and energy
- Interactions and interdependencies
- Genetics and Evolution

Chemistry

- The Periodic table
- Matter
- Chemical Reactions
- Energetics
- Materials
- Earth and Atmosphere

Physics

- Energy
- Motion and Forces
- Waves
- Electricity and Electromagnetism
- Matter

Individual academies will determine the exact sequence of study.



“THROUGHOUT THE CURRICULUM STUDENTS DEVELOP A LIFELONG LOVE OF LEARNING AND THE NECESSARY SKILLS TO BE A RESILIENT, CONFIDENT AND INDEPENDENT LEARNER.”

How are students taught and assessed?

Pupils will sit a short, nationally benchmarked test at the start of year 7 (Progress in Science – GL Assessments).

Typical units consist of 3-4 weeks of teaching and will culminate in a written summative assessment. They will also complete a formative task approximately halfway through the topic.

Schemes and lesson sequences are designed to build knowledge with assessment points used to inform responsive teaching to help students secure that knowledge and link it to prior and future learning.

Homework is usually set weekly and involves guided retrieval practice and consolidation of the work done in lessons. Revision strategies are explicitly taught and modelled in lessons so that students are well prepared to revise for assessments.

Pupils will sit a short, nationally benchmarked test at the end of year 8 (Progress in Science – GL Assessments).

Typical Curriculum Allocation:
6-8 hours per fortnight



Curriculum Overview

Key Stage 4

Curriculum Aims

Building on the breadth of knowledge learned in KS3, KS4 science explores domain specific knowledge in more depth. The cross-curricular schema in KS3 is developed, with more links built within the disciplines of biology, chemistry and physics, as well as between those disciplines.

There is an increased focus on disciplinary knowledge through practical work, including the skills required and the application of the scientific method. Students are encouraged to predict the outcomes of practical investigations, using the knowledge they have developed in their lessons. Students are also encouraged to critically evaluate their skills and the practical design to suggest changes that would increase the accuracy, validity and precision of their results.

Much like KS3, the KS4 curriculum is designed to spiral, ensuring core substantive knowledge is revisited, refined and easily retrieved. The core knowledge from year 9 (and KS3) is revisited throughout years 10 and 11. This spaced practice improves the recall of that core knowledge and ensures new learning is built upon strong foundations.

GCSE science prepares and inspires students for further vocational and/or academic study, but also ensures that students who do not go on to study science have the understanding and knowledge necessary to navigate an increasingly scientific world.



Key Curriculum Content

AQA GCSE Combined Science: Trilogy



Paper 1

- Biology – Cells, Organisation, Infection and Response, Bioenergetics
- Chemistry – Atomic structure and the periodic table, Bonding, structure and the properties of matter, Quantitative chemistry, Chemical changes, Energy changes
- Physics – Energy, Electricity, Particle model of matter, Atomic structure

Paper 2

- Biology – Homeostasis and response, Inheritance, Variation and evolution, Ecology
- Chemistry – The rate and extent of chemical change, Organic chemistry, Chemical analysis, Chemistry of the atmosphere, Using resources
- Physics – Forces, Waves, Magnetism and Electromagnetism

AQA GCSE Separate Sciences

The separate science course extends the study of the above topics. In addition to this, GCSE Physics includes a topic on Space.

Pupils studying the separate sciences will take GCSEs in Biology, Chemistry and Physics. The separate science qualification awards 3 GCSEs.

Individual academies will determine the exact sequence of study, but all academies sit the same assessments.

Typical Curriculum Allocation:
10 lessons per fortnight

How are students taught and assessed?

Our science curriculum is aspirational and it is our ambition that all Meridian Trust students have the opportunity to study separate science and achieve 3 GCSEs, provided they demonstrate the requisite enthusiasm, effort and engagement.

Pupils will sit in-class examinations towards the end of Year 9. These focus on the core knowledge required in GCSE biology, chemistry and physics, and are used diagnostically to ensure pupils are ready to build on that knowledge.

Year 10 pupils sit full GCSE length paper 1 mock examinations in the summer term.

Our emphasis in year 11 is to develop students' overall schema of the science course, bridging the content and skills within and between biology, chemistry and physics. This involves reinforcing and enriching the knowledge gained in year 9 and 10, as well as building links between disciplines.

Pupils sit full GCSE length mock examinations in November and March of year 11, then the real exams in May and June.

Homework is primarily retrieval practice and exam skills-based, but is also used to introduce students to the academic and vocational opportunities at key stage 5 and science-linked careers.



Curriculum Overview

Key Stage 5

Curriculum Aims

Our KS5 science provision includes two different routes: A Level sciences and vocational qualifications. A Level sciences focus on specific disciplines (biology, chemistry, or physics), while the vocational qualifications include content from all three.

The schema built at key stages 3 and 4 are reinforced and developed in more depth in both the A Level sciences and vocational qualifications. The disciplinary knowledge shifts towards detailed mechanistic explanations of the world around us and why it behaves the way it does. Like KS3 and 4, the KS5 curriculum is designed to spiral, where concepts learned in year 12 and revisited and reinforced in year 13.

The vocational courses have a curriculum focused on building the skills and understanding necessary to start work in a scientific field, from laboratory assistant to forensic science. There is an emphasis on building the core skills needed to thrive in these environments, from making accurate measurement using diverse devices, to preparing high quality standard solutions. Technical proficiency is a core goal of the vocational key stage 5 science curriculum.

Both the vocational and A Level routes prepare students for further study at university, as well as transition into science-based employment and/or apprenticeships including with the NHS, pharmaceutical companies, technical laboratories and forensics.



Key Curriculum Content

A Level biology courses include content such as:

- The development of practical biology skills

- Foundations of biology

- Exchange and transport in plants and animals

- Biodiversity, evolution and disease

- Communication, homeostasis and energy

- Genetics, evolution and ecosystems

A Level chemistry courses include content such as:

- The development of practical chemistry skills

- Foundations of chemistry

- The periodic table and energy

- Core organic chemistry

- Physical chemistry and transition elements

- Organic chemistry and analysis.



A Level physics courses include content such as:

The development of practical physics skills

Foundations of physics

Forces and motion

Electrons, waves and photons

Newtonian world and astrophysics

Particles and medical physics

The **vocational science** courses include content such as:

Principles and applications of science

Practical scientific procedures and techniques

Science investigation skills

Laboratory techniques and their application

Physiology of human body systems

Genetics and genetic engineering

Practical chemical analysis

Biomedical science

Medical physics applications

Materials science

Forensic evidence, collection and analysis

**Typical Curriculum Allocation:
A Level, 8-10 hours per fortnight**



How are students taught and assessed?

A Level science students finish with their A Level qualification and a separate practical endorsement based on the successful mastery of specific laboratory skills. The A Level qualification is awarded based on end of course external examination, while the practical endorsement is awarded based on internal and ongoing assessment.

The vocational qualifications are awarded based on internally assessed coursework external examinations (which can be sat at different points throughout the course).

Vocational and A Level subjects are taught by subject specialists and emphasise practical investigations to build skills and understanding of the underlying scientific knowledge.

Students sit end of topic assessments to gauge their progress and are also formatively assessed on their practical skills throughout the course.

Homework is a mix of teacher assigned work to consolidate knowledge and independent student work. To help students make that independent work as effective as possible, we teach and model how this should be done as part of the year 12 lessons.

A Level students sit mock exams at the end of year 12 and in the middle of year 13, with their final examinations at the end of year 13.

Vocational students sit final exams throughout the course, often in January and June in year 12 and 13, and will sit mock exams ahead of those in order to help prepare them.

Curriculum Overview

Enrichment

Beyond the classroom

There is a vast array of opportunities to experience science outside our schools and we are keen for our students to extend the boundaries of their learning by engaging in them.

These include:

- Competitions such as the Biology Olympiad and the Royal Society of Chemistry's Top of the Bench.
- Facilitating work experience with STEM based employers.
- Visits to museums, universities, laboratories and institutions such as the National Space Centre.
- "Speed-dating" information sessions based on STEM careers and Medicine.
- Presenting at Cambridge University's "Schools Zone" event during British Science Week.
- Hosting scientists, engineers, lecturers and graduate students to present their work and career pathway to our students, inspiring the next generation of scientists and engineers.



Cross-Trust Activities

The science students across Meridian Trust participate in trust-wide science competitions and experiences. These include key stage specific competitions where students use their biology, chemistry and physics knowledge to solve challenges such as "make a bubble that can be bounced the maximum number of times". Running events at scale allows us to offer a wider and richer range of activities. Other experiences, like science themed escape rooms, offer students the opportunity to put their science knowledge to the test in novel situations.

Meridian Trust schools partner with organisations such as the Ogden Trust, Cambridge Science Centre, EDT and STEM learning, through Enthuse Partnerships, to ensure our students have access to high quality science enrichment experiences, including portable planetariums, hosting Science Centre exhibitions and Family STEM evenings where students and their families build and learn together.

Our Science Festivals allow key stage 3 students to design, run and present novel investigations to their peers, parents and primary school students. These popular events tie in with the CREST award, ensuring our pupils' excellent work is formally recognised.





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