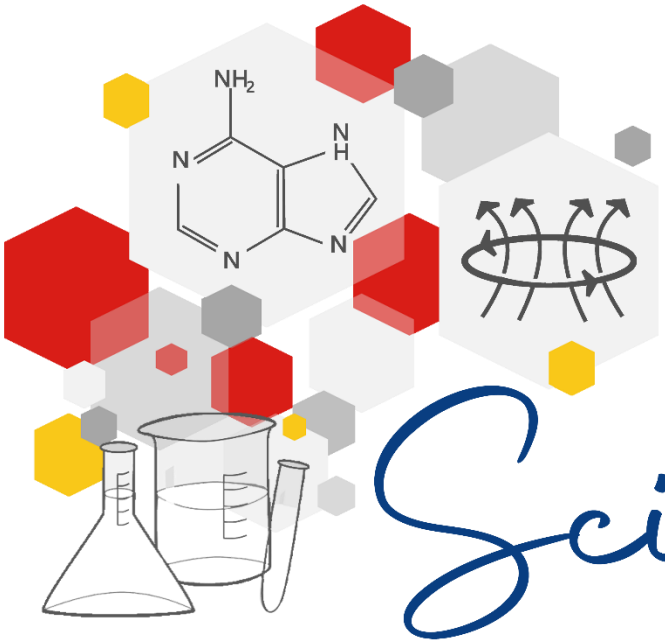
Ashby School
Empowered to Learn

Curriculum Information

Key Stage 4



Science Faculty

"Students appreciate that Science is a way of thinking much more than it is a body of knowledge"

For yourself & for others

LiFE
Inspiration Innovation Integrity

Curriculum Intent

Science isn't just lab work carried out by people in white coats… it's everywhere! From the moment you get up in the morning to the moment you go to sleep at night, science plays a huge part in our daily lived. At Ashby School, we inspire and enthuse students by encouraging them to discover and investigate the phenomena of the world around them and to witness that *Anything is Possible!*

GCSE Biology, Chemistry and Physics

Biology, Chemistry and Physics are taught by subject specialists. Science teachers follow an agreed scheme of work and all staff utilise the same lesson resources, although the expectation is that staff will adapt these as appropriate to suit the needs of their classes. Shared resources facilitate: greater parity of experience for students; ensure timely delivery of the specification through sequences of deliberately connected lessons; and ensure that appropriate emphasis is placed on development of mathematical and experimental skills alongside scientific theory. Lesson resources are reviewed on an annual basis and are continually developed to enhance the learning experience for students and ensure that they receive deliberately connected sequences of lessons. All staff contribute to the review and development of lesson plans and resources. Staff with extensive experience as AQA examiners play a particularly prominent role in helping to develop resources that address weaknesses or issues in candidate's knowledge and skills as identified by examiner's reports or by in-house enhanced results analysis. Lesson resources are also regularly reviewed to ensure that materials are as relevant and up to date as possible, for example practise exam questions are updated as new materials become available. Required practicals are a prominent feature of GCSE science specifications and exam papers include numerous questions based on the knowledge and skills that students develop through carrying these out. The schemes of work for the two specifications therefore dedicate significant time to lessons focussed on required practicals.

Students are set a biweekly homework to support revision of key topics. Students are required to create a mind map on a selected topic and complete an exam question that deals with common misconceptions. All students receive the same homework task. This task is adapted for higher tier and foundation tier to ensure appropriate challenge. Additional homework tasks may be set by subject teachers as appropriate to the needs and progress of their classes. Feedback is provided in accordance with the school Assessment and Feedback Policy.

Tests and exams are set using past AQA exam questions and are marked in accordance with examiner's mark schemes. Papers are compiled in a way that mirrors the design and level of demand of GCSE exams as closely as possible. Grade boundaries for end-of-topic tests have been formulated after all papers have been marked based on the proportion of Ashby School students who would typically be awarded each grade. End of year 10 exams and year 11 mock exams utilise past exam papers and AQA grade boundaries are applied. In this way students, teachers and parents should receive a realistic picture of a student's progress and the grade they are most likely to achieve at GCSE. Early GCSE assessments in Years 9 10 are common to all students. This is to facilitate objective comparison of student performance and the movement of students to a set that best supports their progress while offering appropriate stretch and challenge. The exam at the end of Year 10 and all assessments in Year 11 have foundation and higher tier papers in order to set an appropriate level of challenge for students and assist with decisions regarding a student's tier of entry for the GCSE exams.

Students are encouraged to develop effective independent learning strategies in preparation for tests, mock exam and their final exams in the summer term of Year 11. Students receive revision advice and materials through the course, a structured programme of in-class Science revision activities following completion of teaching in Year 11, revision timetables to help them manage their time and workload, and banks of past exam questions that can be accessed via the student portal. Students are also encouraged to attend online and after-school revision sessions.

GCSE Biology

The GCSE specification consists of seven Biology topics. Two topics are taught in Year 9, three topics are taught in Year 10 and two topics are taught in Year 11. Teaching fewer topics in Year 11 allows time for mock exams and a structured revision programme in the weeks preceding final examinations. Topics taught at the start of the course, such as Cell Biology, recap basic biological knowledge (e.g. cell ultrastructure) that most students will have some familiarity with from KS3. Early topics then introduce ideas such as cell differentiation that students need in order to understand more complex ideas (e.g. therapeutic cloning) later in course. Topics such as Homeostasis and Inheritance require students to draw on knowledge and concepts from across the course and are therefore placed towards the end of the programme.

Biology topics: teaching order

Topic	Specification reference	When taught
Cell Biology	4.1	Year 9 – topic 1
Organisation	4.2	Year 10 – topic 1
Infection and response	4.3	Year 9 – topic 2
Bioenergetics	4.4	Year 10 – topic 2
Homeostasis and response	4.5	Year 10 – topic 3
Inheritance, variation and evolution	4.6	Year 11 – topic 1
Ecology	4.7	Year 11 – topic 2

GCSE Chemistry

The GCSE specification consists of ten Chemistry topics. Topics are taught in the order set out in the AQA specification. Topics taught at the start of the course, such as Atomic Structure and the Periodic Table, underpin the whole Chemistry course and build the basic knowledge that students will need for the subsequent topics. Further early topics then introduce ideas such as how atoms make larger structures in Bonding, Structures and the Properties of Matter that students need in order to understand more complex ideas (e.g. Organic Chemistry) later in the course. Topics such as Chemical Changes require students to draw on knowledge and concepts from the early topics in the course and are therefore placed towards the end of Year 10. Topics taught in Year 11 build upon the basic concepts studied in Year 10 including bonding in Organic Chemistry, ions and ionic formula in Chemical Analysis and the concepts introduced in energy changes are extended in the Rates and Extent of Chemical Change topic. Quantitative Chemistry concepts run through the entire course so this topic is taught during Year 10 to enable students to gain confidence and practice these key calculations throughout the course.

Chemistry topics: teaching order

Topic	Specification reference	When taught
Atomic Structure and the Periodic Table	5.1	Year 9 – topic 1
Energy Changes (part 1, Metal Reactivity and pH)	5.4	Year 9 – topic 2
Chemistry of the Atmosphere	5.9	Year 9 – topic 3
Bonding, Structures and the Properties of Matter	5.2	Year 10 – topic 1
Energy Changes	5.5	Year 10 – topic 2
Chemical Changes (part 2, Electrolysis and Cells)	5.4	Year 10 – topic 3
Quantitative Chemistry	5.3	Year 10 – topic 4
Rate & Extent of Chemical Change (part 1, Rates)	5.6	Year 10 – topic 5
Rate & Extent of Chemical Change (part 2, Equilibrium)	5.6	Year 11 – topic 1
Organic Chemistry	5.7	Year 11 – topic 2
Chemical Analysis	5.8	Year 11 – topic 3
Using Resources	5.10	Year 11 – topic 4

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GCSE Physics

Topics are taught in the order set out in the AQA specification. Energy is a fundamental area of Physics, and types of energy are referred to throughout the course, so we start with this.

Electricity builds upon the energy topic. For example, the idea of wasted heat energy in electrical circuits refers back to the earlier efficiency lesson in the energy topic. Now the students are able to understand why heat energy is dissipated through use of the particle collision theory of current and resistance. There are many practical lessons in the electricity topic so placing it here is a good point to maintain interest in the course before the more theoretical topics later on.

Particle nature of matter builds upon previous knowledge of solids, liquids and gases (KS3) and extends this to include specific heat capacity and specific latent heat. These are difficult concepts to grasp so placing them here is helpful as students will have gained confidence by this point from working through easier topics.

The Atomic Structure topic has numerous cross-links with GCSE Chemistry. At this point in the course, students have already covered atomic structure in Chemistry, so this is an ideal opportunity recap knowledge, reinforce understanding and extend thinking. The development of the nuclear model from the alpha scattering experiment is covered in both sciences.

Forces builds upon the earlier topic of work done/energy transfer from the energy topic. For the Hooke's law investigation it also revisits the concept of a spring constant from the elastic potential energy lesson from the first half-term. It explores Newton's laws of motion, a key concept of any Physics course. Gradient calculations of motion graphs and resultant force calculations involving Pythagoras' theorem and trigonometry occur in this topic. Students would have been unable to tackle these earlier in the course but by this point they have the knowledge and skills from their mathematics course to study them.

Space Physics explores the origin, scale and structures of the universe. Students learn about the components of our solar system, the life cycle of stars and the Big Bang Theory with its supportive evidence.

The waves topic reintroduces familiar concepts from KS3 about wave properties, reflection and refraction.

The magnetism and electromagnetism topic builds upon previous knowledge from KS3. It introduces some new concepts, particularly the motor effect and transformer theory. We revisit the earlier National Grid topic from year 10 electricity and explain how the transformers actually work.

A comprehensive revision programme then follows, leading up to the final exams.

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GCSE Physics topics - teaching order

Topic	Specification reference	When taught
Energy	4.1 (excluding 4.1.1.2)	Year 9 Topic 1
Electricity	4.2.1	Year 9 Topic 2
Particle model of matter	4.3.1	Year 9 Topic 3
Energy and Particle equations	4.1.1.2 and 4.3.2	Year 10 Topic 1
Electricity	4.2.2 – 4.2.5	Year 10 Topic 2
Atomic structure	4.4	Year 10 Topic 3
Space physics	4.8	Year 10 Topic 4
Forces	4.5	Year 11 Topic 1
Waves	4.6	Year 11 Topic 2
Magnetism and electromagnetism	4.7	Year 11 Topic 3

Links to specifications:

Biology - https://www.aqa.org.uk/subjects/biology/gcse/biology-8461/specification

Chemistry - https://www.aqa.org.uk/subjects/chemistry/gcse/chemistry-8462/specification

Physics - https://www.aqa.org.uk/subjects/physics/gcse/physics-8463/specification