



# Curriculum *Newsletter*

## SCIENCE

Science helps us to understand the world around us - how it functions and how it might change in the future. Science is more than a collection of facts and figures; it is a process for learning about the natural world, the study of elements of the Earth and beyond into the observable universe. Everything we know about the universe is as a direct result of scientific research and experiment.

We can all have ideas about how the world might work or why something might happen, but science allows us to make predictions and design experiments to test those ideas. From the motion of particles too small to see, to the life and death of giant stars in distant galaxies; the science department's goal is to start you on a pathway of discovery about the universe that will last a lifetime.

As a student of science, we will not only increase your knowledge and curiosity of science... we will make you into a scientist!

## Curriculum intent

Students will cover a wide range of topics that develop their scientific skills throughout our curriculum. These include investigating, observing, experimenting by testing out ideas, then analysing and evaluating their findings. The way scientific ideas flow through our curriculum supports students in building a deeper understanding of science from the fundamental to more complex concepts and content. For example, learning simple facts about light and waves in KS3, leading to drawing and interpreting ray diagrams and calculating magnification at KS4, culminating in applying this to significant turning points in science such as Young's double slit experiment. Our goal in science is not only to develop student confidence in recalling scientific knowledge and applying scientific concepts but to

develop independent scientists who can question scientific evidence and make informed opinions on moral and ethical issues facing society, such as developing a sense of responsibility for our planet.

Students will be encouraged to talk, read, and write about the science we observe in the classroom but also keep up to date with scientific developments that can impact our lives daily. Opportunities are explored regularly to build on science in the news, important developments in science during lesson discussions and homework tasks. This will all be brought together as students engage with science in its many forms, theoretically, mathematically, and practically through models and experimentation.

## Key Stage 3 Curriculum

Throughout Key Stage 3, students will study the fundamentals of science, including cells and organisation, reproduction, and ecosystems in biology; matter, pure and impure substances, and atoms and the periodic table in chemistry; and energy, forces and motion, space, electricity and magnets, and waves in physics. They will develop a deeper understanding of a range of scientific ideas in the subject disciplines of biology, chemistry and physics. This will incorporate the development of practical skills, data analysis and mathematical skills, as well as developing their critical thinking through the planning and analysis of experiments. Knowledge is built upon through spiral learning and the curriculum is designed to build on previous learning from KS2, whilst then preparing students for science in KS4. Pupils should begin to see the connections between these subject areas and become aware of some of the big ideas underpinning scientific knowledge and understanding.

## Key Stage 4 Curriculum

Key stage 4 continues with the process of building upon and deepening scientific knowledge and the understanding of ideas developed in earlier key stages in the subject disciplines of biology, chemistry and physics, as well as providing a platform for further study at a more advanced level. Through KS4 we build on the topics taught at KS3, linking to new and innovative science concepts and ideas to explain how the world around us in constantly changing and developing. We study the development of key ideas in science such as the model of the atom and the periodic table, as well as how these changing ideas impact society as a whole.

Students in KS4 will study either AQA separate sciences and gain 3 grades (1 in Biology, 1 in Chemistry and 1 in Physics) or AQA Combined Science-Trilogy and will gain 2 grades, resulting from a combination of all 3 sciences. Whichever qualification students embark upon, they will have ample opportunity to enhance investigative skills with the required practical element playing a large part in both courses.

In biology, students will study the core principles including cell biology and organisation. Once students have gained a good grasp of the key principles, they will then apply this knowledge when studying topics such as infection and response, bioenergetics, homeostasis, inheritance and evolution, and ecology.

Chemistry at KS4 allows students to build on their knowledge of the core principles from KS3 and investigate the atomic model and development of the periodic table, structure, bonding and the properties of matter. Students will begin to apply mathematical skills in quantitative chemistry, deepen their understanding of chemical reactions by studying chemical and energy changes and the rate and extent of chemical change. As students' progress through KS4 they will apply chemistry to the world around them in topics such as organic chemistry, chemical analysis, chemistry of the atmosphere and discovering how we use resources in our everyday lives.

In KS4 physics, students will investigate the fundamentals of energy and electricity, the particle model and atomic structure. Key topics such as forces and waves, covered in KS3, will be enhanced and deepened and students will have the opportunity to utilize their skills and knowledge to investigate magnetism and electromagnets and the intricate workings of the universe in space physics (physics only topic). With such an array of material and evidence across the 3 sciences, there truly is something for everyone in this subject.

## Key Stage 5 Curriculum

Studying science at A-Level enhances critical thinking skills and allows for an even deeper understanding of complex scientific concepts. Students will begin to understand processes at a more detailed and sometimes molecular level, using very complex terminology to describe and explain these processes and apply their understanding to unfamiliar situations. **Science A levels** are valued for lots of careers other than just **science**, particularly where there is an analytical or quantitative element to them.

KS5 biology provides a steppingstone for future study. Students will study AQA A-Level biology and further enhance their understanding of cell structure and function, structure of important biological molecules, how organisms exchange substances with the environment and the energy transfers that take place inside living organisms. A-Level biology gives students the opportunity to sample the world around them and see first-hand how organisms are distributed when they study populations and ecosystems. The genetics units allow students to build on knowledge of how genes control our characteristics, while discovering how gene expression is controlled and learning how gene technologies can enhance the possibilities of treating diseases.

A-Level Chemistry again allows students to deepen their understanding of concepts from KS4. Students will study AQA A-Level chemistry and will study physical, organic and inorganic chemistry. They will complete a variety of practical lessons throughout the course including titrations, identification of ions in compounds, and even making aspirin!

AQA A-Level physics will allow students to study core concepts such as measurements and their errors, particles and radiation, waves and mechanics and materials. Students can further enhance their understanding of electricity and study further mechanics and thermal physics, fields and their consequences and nuclear physics. At A-Level physics students will undertake an option module from astrophysics, medical physics, engineering physics, turning points in physics or electronics.

## **Studying science can open doors ...**

Studying sciences at GCSE and A-Level can lead to many different opportunities - the career possibilities are endless. Examples include both science specific careers and ones that apply the skills more broadly. For example:

- Research scientist
- Doctor
- Biochemist
- Biologist
- Chemist
- Physicist
- Zoologist
- Nurse
- Astronomer
- Nuclear physicist
- Forensic chemist
- Engineer
- Dentist
- Chemical analyst
- Data analyst
- Teacher
- Scientific Journalist

There really is something for everybody in the world of science.