

# Physics Curriculum at Ratton School

## Intent

Physics involves the study of matter and its motion through space and time, along with related concepts such as energy and force based around the key principles of atomic structure, energy, electricity, forces, waves and radioactivity and practical experimental skill and technique. Intertwined with these core concepts are numeracy skills required to process the results of investigations and make informed predictions about related concepts.

Our curriculum follows the aims of the National Curriculum; to ‘develop a deeper understanding of a range of scientific ideas in the subject disciplines of biology, chemistry and physics’ and in addition, ‘students are encouraged to relate scientific explanations to phenomena in the world around them and start to use modelling and abstract ideas to develop and evaluate explanations.’ (National curriculum in England, 2014 DfE). The purpose of the KS3 curriculum is to develop practical skills, foster and develop a passion for science in the world around us and to increase knowledge of the living processes.

Our aim is to provide all students with a solid background of understanding, and a high level of numerical skill and ability to formulate arguments rationally and logically. Some students may enter higher education or employment with the need to utilize the skills and knowledge they have learnt in the scientific disciplines whilst at school. Some students are unlikely to pursue employment in a career related to Science but will still benefit from a broad appreciation of the scientific rules governing the way the world works, recognise the benefit of rational explanation and be encouraged to be curious about natural phenomena.

Qualitatively, we see a huge positive impact for students through the school virtues which we instil in everyday teaching and everyday expectations: Compassion, Respect, Creativity, Teamwork, Effort, Responsibility is endemic to all we do and expect of our students. This approach adds enormous value to students when they progress to further education and their future careers where their resilience and skills can be applied in wider society as global citizens.

At Ratton school, our ambition is to develop confident, creative, caring students who achieve excellence. An integral part of this is developing the cultural capital of all students. We have run a successful and well-attended STEM club for KS3 students for many years, alongside science week Forensic Science workshops, inflatable planetarium visits and yearly trips to GCSE ScienceLive! And the Big Bang Science Fair Southeast.

At both Key Stages, the intent of our curriculum is to instil passion and enjoyment in Physics, and this is achieved by having teachers who are passionate about the subject and their specialism. Our students gain more than the knowledge of the National Curriculum. We teach new emerging technologies and encourage students to be critical

of new scientific ideas as they emerge. An example of this is where we discuss the hidden impact of physical phenomena in our everyday lives - the risks and benefits of using sound waves and electromagnetic waves in medical procedures, how the development and safe use of nuclear energy are key to supplementing renewable energy sources for a growing population, or how the principles of energy transfers allow us to enjoy the thrills of a rollercoaster ride. We hope our students finish their Physics curriculum with an appreciation of the physical processes and phenomena pertinent to their lives.

By the end of KS3 students are developing their own analytical skills by planning, carrying out and evaluating their investigations. Exam skills are also introduced at KS3 through regular assessments which include foundation GCSE style longer response questions. Physics at KS3 is challenging and has already introduced GCSE topics, so the students are already very familiar with the content and exam style.

## **Implementation**

The organisation of the delivery of the units is designed to support the progression of skills and knowledge from Key Stage 3. The KS4 curriculum requires more specialist vocabulary which is developed over the two-year course. Practical skills are honed through the core required practicals that are requirements of the course.

The GCSE course begins for all students at the start of Year 9. At the end of the year, those students consistently performing at the higher grades will be chosen to continue with the separate science courses in Years 10 and 11. All other students will study the Trilogy Combined Science course.

At KS4, teachers follow the objectives from the AQA exam board specification - for both AQA GCSE Physics and AQA Trilogy Combined Science. There are two tiers of study - Foundation and Higher to allow access to understanding and challenge for all.

As already mentioned, our KS4 curriculum goes beyond the demands of the AQA specification. There are many opportunities to understand in greater detail how Physics impacts their day-to-day existence. With the current energy crisis, for example, it is vital the students know where the electricity and fuel to heat their homes comes from, how to prevent the wastage of these valuable resources and the impact on the environment that their use has. An important life skill is to be able to evaluate the risk and benefit of our actions and choices, of course the aim of KS4 is to prepare students for the external exams they will sit, but to also develop a passion for Physics, STEM careers, and the ability to think critically and analytically about the science they experience or read about in their everyday lives.

The students will study the content from published specifications and the National Curriculum, but they must also be able to apply mathematical skills fluently to handle

and manipulate data. Students must also be able to apply their chemistry and physics knowledge throughout.

There are certain principles that are essential to a successful Physics learner, these are:

- To learn from experience rather than passively listening. Where possible, practical investigations are carried out to prove phenomena and present information scientifically. We have trained technicians to help us develop investigations, but also use guidance from CLEAPSS and other professional organisations. All investigations are assessed for health and safety.
- To be curious and ask questions; students are encouraged to ask, 'Why and How?' when met with new material.
- Knowledge should be transferred to the long-term memory through practice and repetition; content is therefore revisited often - every lesson has a starter activity linked to retrieval of prior learning and knowledge. Content is either covered directly (aim of lesson) or indirectly (building upon previous content).
- All our students are unique, and so lessons and teaching are adapted to meet the needs of all the students.
- Summative and formative assessments are implemented frequently and are used to base teacher assessments upon.
- Intrinsic cognitive load is managed by designing a curriculum and sequence of study that ensures students master the fundamental basics before moving to complex theories through the spiral curriculum. Our aim is for students to gain a depth of understanding and an appreciation for the interconnected nature of scientific concepts, rather than just committing facts to memory

In key stage 3, homework is set fortnightly using the Educake online learning package and at Key Stage 4, the GCSEpod online learning package. Homework is used to challenge and enhance the learning that students do in the classroom.

Use of regular formative verbal and written feedback and student responses in TICK time activities allows teachers and students to identify areas of strength and those in need of development. This information is used to inform planning to help close gaps and correct misconceptions.

The 6 principles are embedded into the Science curriculum planning, also the teaching within lessons. These concepts are key to the successful delivery of the curriculum and are fundamental to the promotion of understanding and then ultimately the progress of all pupils. Disadvantaged students are supported effectively by the 6 principles teaching strategies and the intervention plans that this informs.

At both Key Stage 3 and 4, the progress of all students is monitored in termly Data Analysis and Intervention meetings (undertaken in one of the fortnightly line management meetings), during which a strategy for support is identified.

Support to help students make progress is also provided by additional help in lessons, use of lunchtimes, plus support sessions after school for selected key stage 4 students

There are no restrictions for SEND students to access the curriculum. Regular contact is made with the SEN department for support.

## **Impact**

Students in Science are well-behaved, engaged and respond well to the ambitious standards set by the Science. We strive to enable all students to make progress, and this can be seen not only in the GCSE exam results but also the improved understanding of scientific concepts throughout Key Stage 3.

Impact is largely assessed by questioning both verbally in lessons and in frequent summative written assessments which test knowledge, understanding and the application of practical skills at both Key Stages, mock GCSE examinations for Year 10 and 11, and then ultimately the outcomes of public examinations.

Baseline testing in Year 7 is used as a starting point to develop knowledge and skills from Key Stage 2. Students are exposed to longer response GCSE style questions from Key Stage 3 to develop their literacy and application of knowledge skills and the use of retrieval practise is embedded into every lesson to help aid the long-term memory of content. Feedback from these assessments gives us a strong guide as to the progress and understanding of our students and allow us to implement timely interventions where necessary.

Regular meetings are held in which assessment data is moderated and standardised, individual performances are discussed, and strategies assigned such as intervention and support sessions.