AQA A Level Physics

Vision statement - Our vision is to develop inquisitive, mathematically confident and independent physicists who use models, evidence and fundamental principles to explain the world around them and solve unfamiliar problems. Students will develop the conceptual, mathematical and practical skills needed to progress into further study and careers across physics, engineering, medicine and technology.

Intent - Our AQA A Level Physics curriculum is designed to develop inquisitive, mathematically confident and independent physicists who seek to explain the behaviour of the universe through models, evidence and fundamental physical principles. Students are encouraged to look beyond memorising equations and develop an understanding of how physical laws can be used to explain real-world phenomena, make predictions and solve unfamiliar problems.

The curriculum is carefully sequenced to establish secure understanding of fundamental physical principles before applying them across increasingly complex contexts. Students develop their knowledge of particles, radiation and quantum phenomena, mechanics and materials, electricity, waves, fields, thermal physics and nuclear physics. The course also provides opportunities to explore more advanced concepts including circular motion, simple harmonic motion, gravitational and electric fields, capacitors, magnetic fields and, through the optional Turning Points content, the development of modern physics and the ideas that challenged classical models.

Mathematical reasoning is central to the curriculum. Students develop fluency in rearranging and applying equations, using SI units, handling standard form, interpreting graphs, resolving vectors, analysing proportional relationships and carrying out multi-step calculations. They learn to select appropriate physical models, identify relevant principles and apply them to unfamiliar situations rather than relying solely on recognition of familiar question types. Graphical, numerical and proportional reasoning are developed progressively throughout the two-year course.

Practical physics is embedded throughout the curriculum to develop students as experimental scientists. Students learn to use a range of measuring equipment accurately, including digital and analogue meters, oscilloscopes, micrometres and vernier callipers, while developing skills in planning investigations, identifying variables, collecting data and analysing uncertainty. Required practical activities provide opportunities to investigate mechanics, materials, electricity, waves, thermal physics and radiation. Students learn to evaluate methods, identify limitations and use evidence to judge the reliability and validity of experimental conclusions.

The curriculum promotes independent problem-solving through retrieval practice, mathematical modelling, practical application and regular exposure to unfamiliar contexts. Students are encouraged to explain physical phenomena using precise scientific language, diagrams, equations and mathematical representations, while evaluating assumptions within physical models. By the end of the course, students should be able to combine conceptual understanding, mathematical reasoning, practical skills and evidence-based evaluation to approach complex physical problems, providing a strong foundation for further study and careers in physics, engineering, medicine, technology and scientific research.

Why study Physics at The Sixth Form at Ridgewood?

- You will get to explore the fundamental nature of almost everything that we know of.
- Physicists explore the entire universe by probing the smallest pieces of matter. You will be starting your journey into a world deep beneath the surface of what you can actually see.
- One of our largest departments, the Science Faculty boasts ten teachers and three technicians. Within this team we have two highly qualified specialised Physics teachers. Their backgrounds and expertise cover a breadth of areas including engineering, nuclear and thermal physics.
- We have three specialist post-16 laboratories in Faraday where the majority of teaching takes place, one for each of Biology, Chemistry and Physics.
- Our A level Physics lab is highly resourced with practical equipment which you will use frequently during your studies.
- Former alumni of the Physics department at Ridgewood have progressed to study medicine, astrophysics, radiography, physics, mathematics, mechanical engineering, chemical engineering, computer science and aeronautical engineering.

What topics will I study in this subject?

Topic	What this means
Particles and radiation	This topic is about fundamental properties of matter, radiation and energy. In this topic you will gain awareness of ongoing development of new ideas in physics and of the application of in-depth knowledge to well-established concepts, regarding the fundamental particles and their interactions.
Waves and optics	In this topic you will look at wave measurements, longitudinal waves and transverse waves. Practical investigations will be carried out to identify the key properties of each; in addition new theories such as stationary waves and wave polarisation will be discussed and investigated.
Mechanics and materials	The principles of mechanics are first looked at in this topic; mechanics is the subject that underpins many work-related areas such as engineering, transport, technology, etc. You will gain a better understanding of the practical applications of physics from this module.
Electricity	In this topic you will study the fundamentals of electrical power; this will build upon your knowledge from GCSE. Additionally, it is a key topic if you decide to pursue any form of electrical or mechanical engineering due to the requirements to understand core concepts.
Further mechanics and thermal physics	This topic will build upon the topic 'Mechanics and materials'. It will focus on advanced maths skills and real life applications of physical forces. Further mechanics is a prerequisite for most university engineering courses as the ideas and skills learnt will be continued in these studies.
Fields	The study of fields is a continuation of 'Further mechanics'. It draws upon skills and ideas to further explain applications in everyday life and in the field of advanced physics; examples of these are from the simple alternator that works within a car, to calculating the required escape velocity of a space shuttle.
Nuclear physics	Nuclear physics looks at the interactions that allow nuclear power stations to work; it builds upon knowledge from 'Particles and radiation' to explain the process behind nuclear power plants.

Turning points	This topic encompasses and looks back through history at specific moments when key ideas were first relied or proven. It will cover a broad topic within physics; everything from Einstein's famous $E=mc^2$, to the discovery of the electron.

What skills will I need in this subject?

Skill	What this skill involves in this subject
AO1 – recall/ remember facts and equations	Demonstrate knowledge and understanding of scientific ideas, processes, techniques and procedures.
A02 – Application of these facts and calculations	Apply knowledge and understanding of scientific ideas, processes, techniques and procedures. These may be when discussing a theory, applying your understanding to a practical or when handling and analysing qualitative and quantitative data.
A03 – Scientific principles	Analyse, interpret and evaluate scientific information, ideas and evidence. This may be when making judgements and reaching conclusions or developing and refining practical design and procedures.

What will my lessons involve?

- Your lessons will contain a variety of different tasks to suit everyone's needs
- Examples of activities include fact recall quizzes on the calculations and the basic definitions needed to complete the AO1 recall, hands-on required practical activities for the practical competencies, research tasks to ensure that the gap between GCSE and A level is met, and teacher led worked examples using model answers in order to demonstrate where the marks are awarded for the AO2 and AO3 questions.
- We also strive to give students regular written feedback on classwork so that you know exactly how to improve and achieve a better grade.
- The course contains a stand-alone practical qualification so there will be lots of opportunities to conduct hands-on practical activities.

What will my independent study involve?

- A significant factor in your success at A level is the quality of your independent study work. This will largely consist of making revision resources and answering questions.
- We expect you to spend nine hours over two weeks completing high quality independent study.
- By the end of the course, top achieving students will have completed many past exam questions.
- A portion of your independent study will also consist of conducting research by searching online, in text books or revision guides. This could be either finding practical methods to conduct in class or researching content prior to lessons.
- As this is a linear course, retrieval practice is essential to achieve the best grades. This involves testing yourself on prior learning frequently and revisiting previous topics.
- It is important for you to regularly reflect on your strengths and areas for development and make improvements to these. The most successful A level Physics students are the ones that do this the most by completing additional notes and questions on areas of weakness. Practice makes perfect!

How will I be assessed?

Percentage exam assessment: 100%	Percentage coursework assessment: 0%

Assessment	Details of assessment
Paper 1	Paper 1 is an examination based upon the first four topics: Particles and radiation, Waves and optics, Mechanics and materials, and Electricity. Exam length – 2 hours. The paper is worth 33% of your final grade.
Paper 2	Paper 2 is an examination based upon the last four modules as well as assumed knowledge from Paper 1. Exam length – 2 hours. The paper is worth 33% of your final grade.
Paper 3 & Turning points	These two papers are sat in the same session; Paper 3 focus on the practical aspect of the course and Turning points is the individual module. Paper 3 exam length – 1 hour 10 mins. The paper is worth 19% of your final grade. Turning points exam length – 50 mins. The paper is worth 14% of your final grade.

How do I know this is the right course for me?

- Studying A level Physics is not only interesting and challenging, it also opens up many future career possibilities as it is a prerequisite for some advanced maths and engineering courses.
- The content follows on nicely from the GCSE Physics course but the demands and skill level are a lot higher, therefore you have to be willing to dedicate your time to developing these.
- There is a large maths demand due to more advance calculations required in A level Physics in comparison to GCSE, so you must enjoy solving numerical problems, and algebraic rearrangements.

What our current A level Physics students say:

- “At GCSE you are taught about basic principles and you have to learn them; at A level you are taught a deeper understanding of these principles and where they come from. This is really interesting and you start to find and notice them in everyday life.”
- “I found the demands of the course hard to cope with at first as this is quite different from GCSE but the teachers are really supportive and helped me to structure my independent study time more effectively so that I could progress.”