

Subject:

Physics

Science Intent:

We study Science because Science is about understanding. Understanding of how everything works, our place, impact, role and responsibilities in the Universe. To explore how scientific ideas develop and how we learn through experimentation. We provide stimulating, engaging and intellectually challenging learning environments to enable all our students to develop their scientific investigative and analytical skills. We are committed to promoting equal opportunity and take up of STEM careers. We want ALL of our students to be able to ask good questions, and thereby make informed decisions. May the force be with you!

Our Exam Board is: AQA

The Big Questions...

Year 12 (AS Level)

Measurements & their errors: What do we mean by SI units & prefixes? What are the sources of uncertainty and how do we minimise them? How can we estimate physical quantities?
Particles & radiation: What are the four forces in the Universe? What is antimatter? How is matter created from energy? How can you annihilate matter? What are quarks? What did Einstein do to get his Nobel prize? What do you mean everything is a wave and a particle?
Waves: What are stationary & progressive waves? What is interference? What do we mean by diffraction? How can you treat refraction quantitatively?
Mechanics & materials: What are moments? What are SUVATs? How can we calculate projectile motion? What are Newton's laws? What is momentum? What is conservation of energy? What are stress & strain? What is the Young modulus?
Electricity: What is resistivity? What is a superconductor? How can you calculate resistance of parallel circuits? What is a potential divider? What are emf & internal resistance?
Required practicals: Frequency of stationary waves. Interference effects including Young's slits & diffraction gratings. Determination of g from free fall. Determination of Young's modulus. Determination of resistivity. Determination of emf & internal resistance of a cell.

Year 13 (A Level)

Further mechanics & thermal physics: What is circular motion? What is simple harmonic motion? What is resonance? What are specific latent heat & specific heat capacity? What is an ideal gas? What is molecular kinetic theory?
Fields & their consequences: What is a field? What is Newton's law of gravitation? What is gravitational potential? How do planets & satellites orbit? What is Coulomb's law? What are electrical field strength & electrical potential? What are capacitors? What is a Tesla? What happens to a moving charges particle in a magnetic field? How do motors work? How do we induce an emf? How do transformers work?
Nuclear physics: What do we mean by nuclear radiation? How can we represent random decay quantitatively? Why do only certain elements/isotopes exist? How can we find the radius of a nucleus? How do you know energy has mass? What is induced fission? What are the safety aspects associated with nuclear radiation?
Option topic: Student focus on their specific area of interest selecting an option topic to study. Options include: Astrophysics, Medical physics, Engineering physics, Turning points in physics or Electronics.
Required practicals: Simple harmonic motion. Boyle's law & Charles's law. Charging & discharging capacitors. Variation of force on a wire with current, flux density & length. Variation of flux linkage with magnetic field direction. Inverse square law for gamma radiation.

What skills will I develop?

Physics deals with a number of complex abstract concepts that are inherently a challenge to understand. By studying them you will develop your ability to:

- visualise & understand complex abstract concepts
- conduct quantitative analysis on real world scenarios
- solve problems, communicate effectively and work within a team

Most students don't realise that the most important outcome from studying Physics is the development of skills that can be transferred to any other area of work. Clearly it can lead to careers in Science however it is also the cornerstone of Engineering and is increasingly required in Medicine. The analytical skills students develop mean it is also in demand from Investment Banking to the legal profession. The Institute of Physics provides more background in their guide to A Level Physics (https://www.iop.org/publications/iop/2015/file_65520.pdf).

What great resources can I use?

- The "Science Read Only Drive" (<https://yateleyschool.sharepoint.com/sites/Science-ReadOnly>) has the best resources we can find including past papers & question packs.
- www.senecalearning.com covers all the core information. Make sure you choose AQA!
- There are a number of A excellent level Physics web-sites available. For example <https://www.antonine-education.co.uk/>

If you can't find what you need ask Mr Stacey !!!

How will I be assessed?

Students will complete a 4 week test to check they are adapting to the additional demands in Year 12 & Year 13. Regular progress/module tests are set to monitor student progress. Mock exams are sat in January of Year 12 (AS) & Year 13 (A Level). Student required practical skills and write-ups are assessed.

Examination:

Students are assessed using a combination of long answer, short answer and multiple choice questions.

Year 12 (AS Level) consists of two 90min papers.

Year 13 (A Level) consists of three 120min papers. Paper 1 is on Year 12 (AS) content plus further mechanics. Paper 2 is focuses on the rest of the Year 13 content but all content can be examined. Paper 3 is divided into two parts: (i) practical skills and data analysis & (ii) the option topic.

Three ways that parents/carers can help...

- 1) Physics programmes are increasingly popular on TV and available to stream. Watching anything presented by Brian Cox or Jim Al-khalili would be excellent – and should inspire students.
- 2) Conduct/build a Physics experiment at home. Googling will provide options from magic tricks (<https://www.youtube.com/watch?v=H9PuZQVrh74>) to building an electric motor (<https://www.youtube.com/watch?v=ziWUmlUcR2k>)
- 3) Set time aside to talk through the Physics that they're learning in class. Ask them to explain it to you, and/or try and relate it to your daily life.

