



# Year 12 Physics



What have students at St. Crispin's been taught to understand and be able to do?

## Core Knowledge

### Module 2 – Foundations of Physics

The aim of this module is to introduce important conventions and ideas that permeate the fabric of Physics.

Understanding of physical quantities, S.I. units, scalars and vectors helps physicists to effectively communicate their ideas within:

- 2.1 Physical quantities and units
- 2.2 Making measurements and analysing data
- 2.3 Nature of quantities.

### Module 3 – Forces and motion

The term *force* is generally used to indicate a push or a pull. It is difficult to give a proper definition for a force, but in physics we can easily describe what a force can do.

A resultant force acting on an object can accelerate the object in a specific direction. The subsequent motion of the object can be analysed using equations of motion. Several forces acting on an object can prevent the object from either moving or rotating. Forces can also change the shape of an object. There are many other things that forces can do.

In this module, learners will learn how to model the motion of objects using mathematics, understand the effect forces have on objects, learn about the important connection between force and energy, appreciate how forces cause deformation and understand the importance of Newton's laws of motion.

- 3.1 Motion
- 3.2 Forces in action
- 3.3 Work, energy and power
- 3.4 Materials
- 3.5 Newton's laws of motion and momentum

## Core Skills

### Module 1 – Development of practical skills in Physics

Practical skills assessed in a written examination

Practical skills assessed in the practical endorsement

Physics is a practical subject. The development and acquisition of practical skills is fundamental. The Physics A-Level course provides learners with the opportunity to develop experimental methods and techniques for analysing empirical data. Skills in planning, implementing, analysing and evaluating, as outlined in **1.1**, will be assessed in the written papers.



# Year 12 Physics continued



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## Core Knowledge

### Module 4 - Electrons, waves and photons

The aim of this module is to ultimately introduce key ideas of quantum physics. Electromagnetic waves (e.g. light) have a dual nature. They exhibit both wave and particle-like behaviour. The wave-particle dual nature is also found to be characteristic of all particles (e.g. electrons).

Before any sophisticated work can be done on quantum physics, learners need to appreciate what electrons are and how they behave in electrical circuits. A basic understanding of wave properties is also required.

In this module, learners will learn about electrons, electric current, electrical circuits, wave properties, electromagnetic waves and, of course, quantum physics.

Learners have the opportunity to appreciate how scientific ideas of quantum physics developed over time and their validity rested on the foundations of experimental work.

4.1 Charge and current

4.2 Energy, power and resistance

4.3 Electrical circuits

4.4 Waves

4.5 Quantum physics.

## How has learning been assessed?

Students will complete regular chapter tests and written response task every half term. This develops writing ability and helps to identify gaps in knowledge  
Students will also complete a summative written mock exam twice a year.

## What is coming up in the following year?

In Year 13 students will develop each of these ideas into more applied topic areas, deepening their knowledge.



# Year 13 Physics



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## Core Knowledge

### Module 5 - Newtonian world and astrophysics

The aim of this module is to show the impact Newtonian mechanics has on Physics. The microscopic motion of atoms can be modelled using Newton's laws and hence provide us with an understanding of macroscopic quantities such as pressure and temperature. Newton's law of gravitation can be used to predict the motion of planets and distant galaxies. In the final section we explore the intricacies of stars and the expansion of the Universe by analysing the electromagnetic radiation from space. As such, it lends itself to the consideration of how the development of the scientific model is improved based on the advances in the means of observation.

In this module, learners will learn about thermal physics, circular motion, oscillations, gravitational field, astrophysics and cosmology.

5.1 Thermal Physics

5.2 Circular motion

5.3 Oscillations

5.4 Gravitational fields

5.5 Astrophysics and cosmology.

### Module 6 - Particles and medical Physics

This section introduces the basic properties of capacitors and how they are used in electrical circuits. The use of capacitors as a source of electrical energy is then developed. This section introduces the mathematics of exponential decay, which is also required for the decay of radioactive nuclei in nuclear and particle Physics.

## Core Skills

### Module 1 - Development of practical skills in Physics

Practical skills assessed in a written examination.

Practical skills assessed in the practical endorsement.

Physics is a practical subject. The development and acquisition of practical skills is fundamental. The Physics A-Level course provides learners with the opportunity to develop experimental methods and techniques for analysing empirical data. Skills in planning, implementing, analysing and evaluating, as outlined in **1.1**, will be assessed in the written papers.



## Year 13 Physics continued



**What have students at St. Crispin's been taught to understand and be able to do?**

This section provides knowledge and understanding of capacitors and exponential decay.

Experimental work provides an excellent way to understand the behaviour of capacitors in electrical circuits and the management of safety and risks when using power supplies. There are many opportunities for learners to use spreadsheets in the analysis and presentation of data. The varied uses of capacitors give the opportunity for the consideration of their use in many practical applications.

6.1 Capacitors

6.2 Electric fields

6.3 Electromagnetism

6.4 Nuclear and particle physics

6.5 Medical imaging.

**How has learning been assessed?**

Students will complete regular chapter tests. This develops writing ability and helps to identify gaps in knowledge.

Students will also complete a summative written mock exam twice a year.

**What is coming up in the following year?**

Many students will use their A-Level Physics to gain entry into University courses studying Physics, Maths and other related courses such as Engineering and computer science which require an understanding of Physics.