

The teaching of physics for combined sciences at the Ecclesbourne School follows a 5 year spiral curriculum based on resources produced through the Oxford University Press via their Kerboodle system. There is emphasis on both substantive knowledge and disciplinary knowledge with numerous opportunities to develop skills to work scientifically. The order tells a coherent and logical story through physics. Students are continually challenged and moved forward, with curiosity and investigation encouraged throughout.

Teaching of KS4 Physics Separate Science

The order of teaching KS4 is taught sequentially with the GCSE AQA Physics 3rd Edition Oxford University Press student textbook*. This is aligned to the AQA specification. The scheme of work has been developed by Jim Breithaupt. The sequencing of substantive knowledge reflects its hierarchical nature. The teaching of disciplinary skills and knowledge are linked to areas of the content where teaching is appropriate. This order is aligned with completion of GCSE Physics Paper 1 and Paper 2 sequentially. This allows for assessment of progress at the end of Year 10 in line with Biology and Chemistry.

* In 2020/21 Year 9 Chapter P2 was deferred to Y10 to allow for practical work to be completed by pupils.

Paper 1

Year	Topic	Term	Content
9	6.1 Energy	1-3	• Conservation and dissipation of energy • Energy transfer by heating • Energy resources <i>Energy is needed to make objects move and keep devices such as mobile phones working.</i> <i>The ability to access energy at the flick of a switch makes life easier. People in developing countries aspire to access energy as easily while those in developed countries are burning too much fuel and are endangering our planet by making the atmosphere warmer.</i> <i>In this section students learn about measuring and using energy and how wind turbines for example don't burn fuel so could enable everyone to have access to energy.</i> <i>This topic is taught first as it underpins the whole course. All subsequent topics can be linked to this section. Delivered over 1 lesson a week allowing time for completion of required practical activities.</i>
10	6.2 Electricity	1	• Electrical circuits • Energy in the home <i>Electric charge is a fundamental property of matter everywhere. Electrical power fills the modern world with artificial light and sound, information and entertainment, remote sensing and control. In this topic students build electric circuits and learn how, together with different components, they transfer energy. They then learn how electricity is used safely in the home, powering our everyday life.</i> <i>Whole electricity topic taught in sequence to allow for the application of knowledge as the dean increases through the topic</i>
10	6.3 Particle model of matter	2	• Molecules and matter <i>The particle model of matter is regarded by some as humanities greatest scientific model. It is widely used to predict the behaviour of solids, liquids and gases and this has many applications in everyday life. In this topic students develop this concept to explain a wide range of observations across the 3 states of matter, find out what happens when a material changes state and learn how to measure the density of materials.</i> <i>Overlap with GCSE Chemistry on structure of atom – provides an opportunity to allow for application on knowledge and understanding. Particle models are developed further with their interactions and energy transfers developed</i>
10	6.4 Radioactivity	2	• Radioactivity <i>Although radioactivity was discovered over a century ago, it took many nuclear physicists several decades to understand the structure of atoms, nuclear forces and stability. In this section students learn how the model of the atom has evolved, observe the different types of radiation and how they behave, and see that ionising radiation is hazardous it can be very useful.</i> <i>Structure of the atom is SAME content delivered in GCSE Chemistry – review and built on for impacts and uses of radiation. Topic requires a high level of understanding so is delivered towards the end of Y10</i>

Paper 2

11	6.5 Forces	1	• Forces in balance • Motion • Force and motion • Force and pressure <i>Forces are an energy pathway that allow us to change our world. Whether this be through movement, design of structures or application of materials, you just can't get away from forces. In this topic students learn about the laws that govern them, the mathematics that describes them and how we use them to explain events and make the world safer. They also investigate the relationship between force and extension of a spring and determine how force is linked to acceleration.</i> <i>To allow for assessments in line with GCSE Papers, this and the following topics are always taught after Paper 1 topics. This allows for consistent assessment in line with GCSE papers, using the Secure Key materials from AQA, examination mark schemes and published grade boundaries.</i>
11	6.6 Waves	2	• Wave properties • Electromagnetic waves • Light <i>Waves are an energy pathway that carry information. When you speak into your mobile phone sound waves carry information. Doctors use X-rays and ultrasonic waves to visualise objects inside the body. In this section students learn about waves and their properties. They carry out investigations into how waves move in water and in solids as well as how different materials emit and absorb waves. Students understand what makes waves so important, study the family of waves called the electromagnetic spectrum and identify their many applications.</i> <i>Builds on foundations from radioactivity topic – focusing on specific medicinal uses and applications of radiation.</i>
11	6.7 Magnetism and electromagnetism	2	• Electromagnetism <i>Two magnets attract or repel each other without being in contact. We use the idea of magnetic fields to explain this. An electric current in a wire also produces a magnetic field. These affects are known as electromagnetism. In this topic students find evidence for the existence of magnetic fields around magnets and current carrying wires. Finally, students see how these affects can be combined to produce motion.</i> <i>Challenging motor effects taught towards the end of Year 11.</i>
11	6.8 Space	2	• Space <i>Questions about where we are, and where we came from, have been asked for thousands of years. In the past century, astronomers and astrophysicists have made remarkable progress in understanding the scale and structure of the universe, its evolution and ours. New questions have emerged recently. In this topic students study our Solar System and learn that stars also have a life-cycle. They see how theories about the development of the Universe, such as the Big Bang theory, are based on astronomical observations and ideas such as red-shift and dark energy.</i> <i>Stand-alone topic, can taught towards the end of Y11, link to maths skills developed across the course</i>

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