

KS3 Curriculum Overview: Physics

Rationale:

In years 7 and 8 we teach Physics separately to Biology and Chemistry, mirroring the divisions between these subjects at GCSE in the way they are taught and examined. These divisions are mirrored further in the Sixth Form at Level 3, in the structure of both A level courses and units of the Vocational BTEC Level 3 National Extended Certificate in Applied Science.

During Years 7 and 8 we aim to build on the knowledge and understanding of Physics gained during Key Stage 2 and provide a firm foundation for further study at GCSE, following the philosophy of a '5 Year Key Stage 4' inherent in the current Programme of Study and National Curriculum for KS3 Science. (In other words, both the knowledge and skills directly gained at KS3 and those developed further during KS4 are tested during the GCSE exams taken at the end of Year 11).

Our Curriculum broadly follows the 'Activate' Scheme of Learning from OUP, in common with Biology and Chemistry; with further topic areas explored to give students a broad knowledge of Physics. This was selected from a number of commercially available courses as we felt it had the most logical sequence to support both sequential development of knowledge during KS3 and subsequently during KS4. It was written by Helen Reynolds of the Institute of Physics, who was also involved in the development of the current National Curriculum and delivered some INSET to us at the time. The KS3 Curriculum has recently been reviewed and new resources have been added along with opportunities for students to 'Go Further' in their learning.

Students begin by studying Electricity and magnetism, an engaging and practical topic with plenty of application to both day to day life and prior knowledge from KS2. It is followed by Energy and Light in Year 7 and then Forces, Space, Sound and Motion and pressure in Year 8 as well as doing more experimental investigations. As far as is possible with separate topics, this sequence means that earlier material is revisited to support later material as well as linking to other subjects' Schemes of Learning such as Mathematics and D&T. Throughout the course, the scientific process is explicitly taught and practised, with many opportunities to safely plan, risk assess, investigate, record, conclude and evaluate practical investigations, together with the relevant maths skills, and key subject-specific vocabulary that will enable students to be scientifically literate.

Reading in the Curriculum:

The Sciences offer many opportunities to develop and extend students' literacy skills. Across the Physics curriculum students will explore new scientific vocabulary. Each unit includes a glossary which students will glue into their exercise books. Literacy also appears in the investigations aspect of our curriculum as students must be able to read methods carefully in order to generate valid results. Students will use texts to find out information for themselves, using the functional layout of such texts, including index, contents and glossary sections of textbooks used in class, and also at home in an online format. Students also have access to dictionaries. There are also literacy activities where students must read samples of texts in order to extract the necessary information to answer questions. Students will also review and connect information within topics, so knowledge organisers are provided for each topic.

Connected Learning:

Topics in the Sciences do not stand alone. Each topic connects to prior knowledge from primary school, other topics learnt or still to be learnt at this school both in the Sciences and in other subjects and also in the outside world. In KS3 a lot of the content directly builds upon their knowledge gained in KS2 Science. The Curriculum Plan has also been developed to coincide with content and skills learned in Mathematics and Design & Technology. This enables students to apply their knowledge across subjects and appreciate that Physics is not a standalone subject, rather it has applications across everyday life. Connected knowledge is discussed in class, starting with the Context Summary which is shared with students at the start of each topic.

Diversity:

Science belongs to everyone, regardless of background, and people from all walks of life contribute to its development and reap its benefits. This is reflected in the examples used in lessons and the Scientists whose work we consider.

The school is particularly committed to promoting diversity in Physics. We will explore the input of physicists across a range of backgrounds to show that science is inclusive. The department is in partnership with the Institute of Physics to promote physics to girls and encourage them to consider physics-based careers. To do this we are adapting our language and approaches to activities to be more inclusive, and plan to run workshops and school trips.

Term / Length of Unit	Outline	Assessment	Home Learning	Resources	Knowledge/Skills End Points	Literacy
Year 7 Autumn Term 1 7P1 Electricity 8 lessons	<p>Students learn about what electricity is and how objects become electrically charged.</p> <p>Students also have hands-on experience of building electric circuits and developing models of what an electric current is and what electric resistance is.</p>	<p>'In the Sciences, Educake quizzes, based on current and previous topics, are set every Monday to be done by the following Monday in a Biology – Chemistry – Physics rotation. Further information is available in the Y7 Blog.</p> <p>Two assessments per half term.</p>	<p>'In the Sciences, Educake quizzes, based on current and previous topics, are set every Monday to be done by the following Monday in a Biology – Chemistry – Physics rotation. Further information is available in the Y7 Blog'.</p>	<p>SoL on science shared area, including powerpoints, details of practical investigations and associated risk assessments, worksheets, revision resources, homework booklet and test.</p> <p>Activate 1 textbook.</p>	<p><u>Knowledge</u></p> <ul style="list-style-type: none"> Explain how objects become positively charged and negatively charged and how this links to static electricity. Draw and identify the symbols used for common circuit components and use these to draw circuit diagrams. Describe what is meant by electric current. Describe what is meant by potential difference. Describe the difference between a series and parallel circuit. Describe what happens to current and potential difference in a series circuit. Describe what happens to current and potential difference in a parallel circuit. Describe what is meant by electric resistance and how to calculate the total resistance in a series circuit <p><u>Skills</u></p> <ul style="list-style-type: none"> Build electric circuits Use an ammeter Use a voltmeter Identify the independent variable Identify the dependent variable Identify the control variables 	<p>Vocabulary and keywords defined and written in own words.</p> <p>Literacy activities that require and develop reading skills</p> <p>P2 Electricity Glossary P2 Electricity and magnetism Glossary.docx</p>
Year 7 Autumn Term 2 7P1 Electricity 5 lessons including assessment and responding to feedback.	<p>Students learn the link between electricity and magnetism.</p> <p>Students also have hands-on experience of constructing electromagnets and</p>	<p>'In the Sciences, Educake quizzes, based on current and previous topics, are set every Monday to be done by the following Monday in a Biology –</p>	<p>'In the Sciences, Educake quizzes, based on current and previous topics, are set every Monday to be done by the following Monday in a Biology – Chemistry –</p>	<p>SoL on science shared area, including powerpoints, details of practical investigations and associated risk assessments, worksheets, revision</p>	<p><u>Knowledge</u></p> <ul style="list-style-type: none"> Recognise that only certain materials (e.g. iron, nickel, cobalt) are magnetic. Explain how like poles repel and unlike poles attract. Draw the shape of a magnetic field and state where the magnetic field is the strongest. 	<p>Vocabulary and keywords defined and written in own words.</p> <p>Literacy activities that require and</p>

	researching the use of electro magnets.	Chemistry – Physics rotation. Further information is available in the Y7 Blog. Two assessments per half term.	Physics rotation. Further information is available in the Y7 Blog’.	resources, homework booklet and test. Activate 1 textbook.	<ul style="list-style-type: none"> Describe how a compass works and how it can be used to map the magnetic field around a magnet. Describe how an electromagnet is made. Describe ways of increasing the strength of a magnetic field around an electromagnet. Describe uses of electromagnets <p><u>Skills</u></p> <ul style="list-style-type: none"> Identify the independent variable Identify the dependent variable Identify the control variables Use plotting compasses to map the magnetic field around a magnet. Investigate the factors affecting the strength of an electromagnet 	<p>develop reading skills</p> <p>P2 Electricity Glossary</p> <p>P2 Electricity and magnetism Glossary.docx</p>
Year 7 Spring Term 1 7P2 Energy 8 lessons	<p>Students learn about various types of energy. They relate energy to thermal transfer such as conduction, convection and radiation. A link is made to the energy demands of the world and the use of energy resources.</p> <p>Students also have hands-on experience of modelling energy stores. Conducting experiments on thermal energy. Presenting different types of energy resources.</p>	‘In the Sciences, Educake quizzes, based on current and previous topics, are set every Monday to be done by the following Monday in a Biology – Chemistry – Physics rotation. Further information is available in the Y7 Blog. Two assessments per half term.	‘In the Sciences, Educake quizzes, based on current and previous topics, are set every Monday to be done by the following Monday in a Biology – Chemistry – Physics rotation. Further information is available in the Y7 Blog’.	SoL on science shared area, including powerpoints, details of practical investigations and associated risk assessments, worksheets, revision resources, homework booklet and test. Activate 1 textbook.	<p><u>Knowledge</u></p> <ul style="list-style-type: none"> What the different types of energy stores are The Law of Conservation of energy The link between energy and temperature What conduction is and how it transfers heat What convection is and how it transfers heat What infra-red radiation is and how effectively different coloured surfaces transfer heat by radiation <p><u>Skills</u></p> <ul style="list-style-type: none"> Experimentally determining what foods have relatively more chemical energy store Identifying different types of energy stores Working safely Experimentally determining which metal in the best conductor of heat. 	<p>Vocabulary and keywords defined and written in own words. Literacy activities that require and develop reading skills</p> <p>P2 Energy Glossary P2.2 Energy Glossary.pdf</p>

					<ul style="list-style-type: none"> Experimentally determining which colour surface emits the most infrared radiation. Identifying control variables Plotting line graphs Drawing conclusions 	
Year 7 Spring Term 2 7P2 Energy 3 lessons including assessment and responding to feedback.	<p>Students learn about the various ways electricity is generated from different types of energy resources. Students make a link between energy, power and work done.</p> <p>Students experimentally determine how much energy is transferred through action.</p>	'In the Sciences, Educake quizzes, based on current and previous topics, are set every Monday to be done by the following Monday in a Biology – Chemistry – Physics rotation. Further information is available in the Y7 Blog. Two assessments per half term.	'In the Sciences, Educake quizzes, based on current and previous topics, are set every Monday to be done by the following Monday in a Biology – Chemistry – Physics rotation. Further information is available in the Y7 Blog'.	SoL on science shared area, including powerpoints, details of practical investigations and associated risk assessments, worksheets, revision resources, homework booklet and test. Activate 1 textbook.	<p><u>Knowledge</u></p> <ul style="list-style-type: none"> What the different types of energy resources there are The purpose of the energy resources The advantages and disadvantages of the different energy resources Know the difference between energy and power Know what is meant by work done Describe the purpose of levers and how they are used in machines to make tasks easier. Describe how gears can be used to speed up objects, change direction or increase force. <p><u>Skills</u></p> <ul style="list-style-type: none"> Using formulae to calculate power and work done 	<p>Vocabulary and keywords defined and written in own words. Literacy activities that require and develop reading skills</p> <p>P2 Energy Glossary P2.2 Energy Glossary.pdf</p>
Year 7 Summer Term 1 7P3 Light 6 lessons	<p>Students learn about luminous and non-luminous objects, reflection, refraction, lenses, the eye, cameras, dispersion and colour.</p> <p>Students also have hands-on experience of using mirrors and ray boxes, prisms, lenses, colour filters, making pinhole cameras and will see and possibly carry out an eye dissection.</p>	'In the Sciences, Educake quizzes, based on current and previous topics, are set every Monday to be done by the following Monday in a Biology – Chemistry – Physics rotation. Further information is available in the Y7 Blog.	'In the Sciences, Educake quizzes, based on current and previous topics, are set every Monday to be done by the following Monday in a Biology – Chemistry – Physics rotation. Further information is available in the Y7 Blog'.	SoL on science shared area, including powerpoints, details of practical investigations and associated risk assessments, worksheets, revision resources, homework booklet and test. Activate 1 textbook.	<p><u>Knowledge</u></p> <ul style="list-style-type: none"> How light travels and why we see luminous and non-luminous objects. The law of reflection How reflection works with different surfaces (shiny/rough) How light is refracted. Describe what happens when light travels through a lens. The anatomy of the eye and the functions of its parts. How a camera works. The composition of white light and why we see colour. The primary and secondary colours of light 	<p>Vocabulary and keywords defined and written in own words. Literacy activities that require and develop reading skills P4 Light Glossary</p>

		Two assessments per half term.			<ul style="list-style-type: none"> How filters subtract light. <u>Skills</u> <ul style="list-style-type: none"> Measuring angles using a protractor Using a ray box, mirror, prisms and colour filters. Drawing ray diagrams. Using a pinhole camera. Making and recording observations. 	
Year 7 Summer Term 2 Revision for PPE and feedback from PPE	Students will recap key content from year 7 in preparation for their PPE. Following the PPE lessons will be used for feedback and actions based on the PPE.	'In the Sciences, Educake quizzes, based on current and previous topics, are set every Monday to be done by the following Monday in a Biology – Chemistry – Physics rotation. Further information is available in the Y7 Blog. Two assessments per half term.	'In the Sciences, Educake quizzes, based on current and previous topics, are set every Monday to be done by the following Monday in a Biology – Chemistry – Physics rotation. Further information is available in the Y7 Blog'.	SoL on science shared area, including powerpoints, details of practical investigations and associated risk assessments, worksheets, revision resources, homework booklet and test. Activate 1 textbook.	See knowledge and skills from the above topics	Vocabulary and keywords defined and written in own words. Literacy activities that require and develop reading skills
Year 8 Autumn Term 1 8P1 Motion 6 lessons	Students learn about speed, motion graphs, force and turning forces. Students also have hands-on experience of investigating speed, forces and moment. They also carry out calculations involving speed, motion graphs and moments.	'In the Sciences, Educake quizzes, based on current and previous topics, are set every Monday to be done by the following Monday in a Biology – Chemistry – Physics rotation. Further information is available in the Y8 Blog.	'In the Sciences, Educake quizzes, based on current and previous topics, are set every Monday to be done by the following Monday in a Biology – Chemistry – Physics rotation. Further information is available in the Y8 Blog'.	SoL on science shared area, including powerpoints, details of practical investigations and associated risk assessments, worksheets, revision resources, homework booklet and test. Activate 2 textbook.	<u>Knowledge</u> <ul style="list-style-type: none"> What speed is. The speed equation. Recognise that different things have different speeds Understand the difference between average speed and instantaneous speed. Identify the features of a distance-time graph. Calculate speed from a distance-time graph. Define acceleration. <u>Skills</u> <ul style="list-style-type: none"> Calculating speed, distance or time. 	Vocabulary and keywords defined and written in own words. Literacy activities that require and develop reading skills 8P3 Forces Glossary

		Two assessments per half term.			<ul style="list-style-type: none"> How to plot and use motion graphs (distance/time). Plotting graphs of acceleration. Identify variables in an investigation. 	
Year 8 Autumn Term 2 8P2 Forces 7 lessons including PPE revision and responding to feedback from PPE.	<p>Students learn about speed, motion graphs, force and turning forces.</p> <p>Students also have hands-on experience of investigating speed, forces and moment. They also carry out calculations involving speed, motion graphs and moments.</p>	<p>'In the Sciences, Educake quizzes, based on current and previous topics, are set every Monday to be done by the following Monday in a Biology – Chemistry – Physics rotation. Further information is available in the Y8 Blog. Two assessments per half term.</p>	<p>'In the Sciences, Educake quizzes, based on current and previous topics, are set every Monday to be done by the following Monday in a Biology – Chemistry – Physics rotation. Further information is available in the Y8 Blog'.</p>	<p>SoL on science shared area, including powerpoints, details of practical investigations and associated risk assessments, worksheets, revision resources, homework booklet and test. Activate 2 textbook.</p>	<p><u>Knowledge</u></p> <ul style="list-style-type: none"> What forces are and what they do. Determine which forces are contact and non-contact forces Describe what is meant by an 'interaction pair'. Explain what causes friction and how it can be useful or a nuisance. Describe how friction can be reduced or optimised. Explain what causes drag forces, for example air resistance and water resistance. Understand how streamlining can be used to reduce drag forces acting on an object. Describe what a resultant force is Explain what happens to the speed of an object when forces are balanced or unbalanced. Describe how forces can deform objects Describe "Hooke's Law" Explain what is meant by a non-contact force Describe what a force field is Explain the difference between mass and weight Calculate weight from mass and gravity. <p><u>Skills</u></p> <ul style="list-style-type: none"> Measuring forces. Plotting graphs of Hooke's law. Using a Newton-meter correctly. Identify the variables in an investigation. 	<p>Vocabulary and keywords defined and written in own words.</p> <p>Literacy activities that require and develop reading skills</p> <p>P1 Forces Glossary</p>

Year 8 Spring Term 1 8P3 Pressure 4 lessons	<p>Students learn how force is related to pressure. They will also learn how pressure varies in the 3 states of matter.</p> <p>Students also have hands-on experience of investigating pressure. They also carry out calculations involving force, area and pressure.</p>	'In the Sciences, Educake quizzes, based on current and previous topics, are set every Monday to be done by the following Monday in a Biology – Chemistry – Physics rotation. Further information is available in the Y8 Blog. Two assessments per half term.	'In the Sciences, Educake quizzes, based on current and previous topics, are set every Monday to be done by the following Monday in a Biology – Chemistry – Physics rotation. Further information is available in the Y8 Blog'.	shared area, including powerpoints, details of practical investigations and associated risk assessments, worksheets, revision resources, homework booklet and test. Activate 2 textbook.	<p><u>Knowledge</u></p> <ul style="list-style-type: none"> What pressure is. How to calculate pressure. How is force related to pressure? What is pressure like in solids? What is pressure like in liquids? What is pressure like in gases? Describe what is meant by a moment. Calculate the moment of a force. <p><u>Skills</u></p> <ul style="list-style-type: none"> Calculating pressure Identifying different types of variables from an experiment Calculating pressure from force and area. 	<p>Vocabulary and keywords defined and written in own words.</p> <p>Literacy activities that require and develop reading skills</p> <p>P8 Pressure Glossary</p>
Year 8 Spring Term 2 8P4 Space 7 lessons including assessment and responding to feedback.	<p>Students learn about the night sky, the solar system, the movement of the earth and moon and their apparent motion, including eclipses.</p> <p>Students also have hands-on experience of modelling these ideas.</p>	'In the Sciences, Educake quizzes, based on current and previous topics, are set every Monday to be done by the following Monday in a Biology – Chemistry – Physics rotation. Further information is available in the Y8 Blog. Two assessments per half term.	'In the Sciences, Educake quizzes, based on current and previous topics, are set every Monday to be done by the following Monday in a Biology – Chemistry – Physics rotation. Further information is available in the Y8 Blog'.	SOL on science shared area, including powerpoints, details of practical investigations and associated risk assessments, worksheets, revision resources, homework booklet and test. Activate 2 textbook.	<p><u>Knowledge</u></p> <ul style="list-style-type: none"> Describe objects commonly visible in the night sky. The order of planets in the solar system, their composition, relative orbits and conditions. The motion of the earth in its orbit and how this explains night and day, seasons and years. The motion of the moon in its orbit and how this explains its normal changes in appearance as well as eclipses. <p><u>Skills</u></p> <ul style="list-style-type: none"> Relating observed phenomena to abstract ideas. Modelling as a means of explaining the behaviour of objects in space. 	<p>Vocabulary and keywords defined and written in own words.</p> <p>Literacy activities that require and develop reading skills</p> <p>P2 space Glossary</p>
Year 8 Summer Term 8P5 Sound 7 lessons including assessment and	Students learn about Waves including types and examples, sound, loudness and pitch, detecting sound (the ear and the microphone), Echoes and Ultrasound.	'In the Sciences, Educake quizzes, based on current and previous topics, are set every Monday to be done by the	'In the Sciences, Educake quizzes, based on current and previous topics, are set every Monday to be done by the following	SOL on science shared area, including powerpoints, details of practical investigations and associated risk assessments,	<p><u>Knowledge</u></p> <ul style="list-style-type: none"> What waves are and the features of a wave. How transverse and longitudinal waves compare. How waves can be reflected. The nature of sound. 	Vocabulary and keywords defined and written in own words.

responding to feedback.	Students also have hands-on experience of modelling waves, measuring sounds, investigating different media and ultrasound and calculations involving the speed of sound.	following Monday in a Biology – Chemistry – Physics rotation. Further information is available in the Y8 Blog. Two assessments per half term.	Monday in a Biology – Chemistry – Physics rotation. Further information is available in the Y8 Blog'.	worksheets, revision resources, homework booklet and test. Activate 2 textbook.	<ul style="list-style-type: none"> • The speed of sound relative to light. • The causes of loudness and pitch. • How the ear works • How microphones work. • What echoes are and how they apply to medical scanning and sonar. • What ultrasound is and how it is used. <u>Skills</u> <ul style="list-style-type: none"> • Modelling waves. • Relating the parts of a wave to aspects of sound. • Carrying out calculations regarding the speed of sound. 	<p>Literacy activities that require and develop reading skills</p> <p>P3 sound Glossary</p>
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