

## 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 Forces, an engaging and practical topic with plenty of application to both day to day life and prior knowledge from KS2. It is followed by Space, Sound and Light in Year 7 and then Magnetism, Motion, Forces, Pressure & Electricity 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 and will have the chance to deduce and perfect their own definitions of scientific keywords. Each unit includes a glossary which students will complete and learn during the unit. 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 text books 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
<p>Year 7 Autumn Term 1 7P1 7 lessons (9 including assessment and responding to feedback lessons)</p>	<p>7P1 Forces</p> <p>Students learn about what Forces are, examples of forces and the effect of balanced and unbalanced forces.</p> <p>Students also have hands-on experience of measuring forces, investigating Hooke's Law, the effect of streamlining and lubrication and calculations involving gravitational field strength.</p>	End of topic test	Satchel:One Quizzes	<p>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>	<p><u>Knowledge</u></p> <ul style="list-style-type: none"> <li>What forces are and what they do.</li> <li>Interaction pairs.</li> <li>Effects of squashing and stretching, Hooke's law.</li> <li>Friction and drag, how they can be useful or a nuisance, how they can be reduced or optimised.</li> <li>Non-contact forces including magnetism, electrostatic force and gravity.</li> <li>What weight and mass are and why they differ.</li> <li>What happens when forces are balanced or unbalanced.</li> </ul> <p><u>Skills</u></p> <ul style="list-style-type: none"> <li>Measuring forces.</li> <li>Plotting graphs of Hooke's law. Using a Newton-meter correctly.</li> </ul>	<ul style="list-style-type: none"> <li>Vocabulary and keywords defined and written in own words.</li> </ul> <p>Literacy activities that require and develop reading skills</p>
<p>Year 7 Autumn Term 2/ 7P4 4 lessons (6 including assessment and responding to feedback lessons)</p>	<p>7P4 Space</p> <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>	End of topic test	Satchel:One Quizzes	<p>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>	<p><u>Knowledge</u></p> <ul style="list-style-type: none"> <li>Describe objects commonly visible in the night sky.</li> <li>The order of planets in the solar system, their composition, relative orbits and conditions.</li> <li>The motion of the earth in its orbit and how this explains night and day, seasons and years.</li> <li>The motion of the moon in its orbit and how this explains its normal changes in appearance as well as eclipses.</li> </ul> <p><u>Skills</u></p> <ul style="list-style-type: none"> <li>Relating observed phenomena to abstract ideas.</li> </ul>	<ul style="list-style-type: none"> <li>Vocabulary and keywords defined and written in own words. <ul style="list-style-type: none"> <li>Literacy activities that require and develop reading skills</li> </ul> </li> </ul>

					<ul style="list-style-type: none"> <li>Modelling as a means of explaining the behaviour of objects in space.</li> </ul>	
<p>Year 7 Spring Term 1 7P2 7 lessons (9 including assessment and responding to feedback lessons)</p>	<p>7P2 Sound</p> <p>Students learn about Waves including types and examples, sound, loudness and pitch, detecting sound (the ear and the microphone), Echoes and Ultrasound.</p> <p>Students also have hands-on experience of modelling waves, measuring sounds, investigating different media and ultrasound and calculations involving the speed of sound.</p>	End of topic test	Satchel:One Quizzes	<p>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>	<p><u>Knowledge</u></p> <ul style="list-style-type: none"> <li>What waves are and the features of a wave.</li> <li>How transverse and longitudinal waves compare.</li> <li>How waves can be reflected.</li> <li>The nature of sound.</li> <li>The speed of sound relative to light.</li> <li>The causes of loudness and pitch.</li> <li>What infrasound and ultrasound are.</li> <li>How the ear works and how microphones work.</li> <li>What echoes are and how they apply to medical scanning and sonar.</li> </ul> <p><u>Skills</u></p> <ul style="list-style-type: none"> <li>Modelling waves.</li> <li>Investigating the speed of sound.</li> <li>Relating the parts of a wave to aspects of sound.</li> </ul> <p>Carrying out calculations regarding the speed of sound.</p>	<ul style="list-style-type: none"> <li>Vocabulary and keywords defined and written in own words.</li> <li>Literacy activities that require and develop reading skills</li> </ul>
<p>Year 7 Spring Term 2/Summer Term1 7P3 5 lessons (7 including assessment and responding to feedback lessons)</p>	<p>7P3 Light</p> <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</p>	End of topic test	Satchel:One Quizzes	<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><u>Knowledge</u></p> <ul style="list-style-type: none"> <li>How light travels and why we see luminous and non-luminous objects.</li> <li>How reflection works with different surfaces.</li> <li>How refraction works and its applications in lenses.</li> <li>The anatomy of the eye and the functions of its parts.</li> <li>How a camera works.</li> <li>The composition of white light and why we see colour.</li> </ul> <p><u>Skills</u></p>	<ul style="list-style-type: none"> <li>Vocabulary and keywords defined and written in own words.</li> <li>Literacy activities that require and develop reading skills</li> </ul>

	and possibly carry out an eye dissection.			Activate 1 textbook.	<ul style="list-style-type: none"> <li>Using a ray box, mirror, prisms and colour filters.</li> <li>Drawing ray diagrams.</li> <li>Observing a dissection and relating this to diagrams.</li> <li>Using a pinhole camera.</li> </ul> Explaining observations.	
Year 8 Autumn Term 1+2 8P1b 16 lessons (4 including assessment and responding to feedback lessons)	8P3 Motion and Forces  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.	End of topic test	Satchel:One Quizzes	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"> <li>What speed is.</li> <li>The speed equation.</li> <li>What is force</li> <li>How many types of forces are there?</li> <li>What are the effects of balanced forces?</li> <li>How forces effect the extension of a spring</li> <li>The effect of turning forces and moment about a pivot.</li> </ul> <u>Skills</u> <ul style="list-style-type: none"> <li>Calculating speed, distance or time.</li> <li>How to plot and use motion graphs (distance/time).</li> <li>Relating observed phenomena to abstract ideas.</li> <li>Identifying different types of variables from an experiment</li> <li>Collecting data when applying force to a spring</li> <li>Plotting graph and drawing a conclusion</li> </ul> Calculating moment from force and distance.	<ul style="list-style-type: none"> <li>Vocabulary and keywords defined and written in own words.</li> <li>Literacy activities that require and develop reading skills</li> </ul>
Year 8 Autumn Term 2 8P2 6 lessons (2 including assessment and responding to feedback lessons)	8P3 Forces and Pressure  Students learn how force is related to pressure. They will also learn how pressure varies in in the 3 states of matter.  Students also have hands-on experience of investigating pressure. They also carry out	End of topic test	Satchel:One Quizzes	shared area, including powerpoints, details of practical investigations and associated risk assessments, worksheets, revision resources,	<u>Knowledge</u> <ul style="list-style-type: none"> <li>What pressure is.</li> <li>The pressure equation.</li> <li>How is force related to pressure?</li> <li>What is pressure like in solids?</li> <li>What is pressure like in liquids?</li> <li>What is pressure like in gases?</li> </ul> <u>Skills</u> <ul style="list-style-type: none"> <li>Calculating area nd pressure</li> <li>How to plot graphs (bar graphs).</li> <li>Relating observed phenomena to abstract ideas.</li> </ul>	<ul style="list-style-type: none"> <li></li> </ul>

	calculations involving force, area and pressure.			homework booklet and test. Activate 2 textbook.	<ul style="list-style-type: none"> <li>Identifying different types of variables from an experiment</li> <li>Collecting data when applying force to a surface</li> <li>Plotting graph and drawing a conclusion</li> <li>Calculating pressure from force and area.</li> </ul>	
Year 8 Spring Term 1 + 2 8P2 8 lessons (10 including assessment and responding to feedback lessons)	<p>Students learn about charge, potential difference, series and parallel circuits.</p> <p>Students also have hands-on experience of investigating electromagnets.</p>	End of topic test	Satchel:One Quizzes	<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"> <li>Recall what charge and potential difference is</li> <li>Know how to build circuits</li> <li>Know how current and pd behave in a series circuit and a parallel circuit</li> <li>Explain what electrical resistance is</li> </ul> <p><u>Skills</u></p> <ul style="list-style-type: none"> <li>Investigate how resistance effects current in a circuit</li> <li>Identify variables</li> <li>Plot a graph</li> <li>Draw a conclusion</li> <li>Apply model to explain resistance</li> </ul>	<ul style="list-style-type: none"> <li>Vocabulary and keywords defined and written in own words.</li> <li>Literacy activities that require and develop reading skills</li> </ul>
Year 8 Summer Term 1 + 2 8P3 10 lessons (12 including assessment and responding to feedback lessons)	<p>8P1b Magnetism</p> <p>Students learn about magnets, magnetic fields, electromagnets and their uses.</p> <p>Students also have hands-on experience of magnets and electromagnets including motors. They investigate the factors affecting the strength of electromagnets.</p>	End of topic test	Satchel:One Quizzes	<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"> <li>How magnets behave and what a magnetic field is.</li> <li>What electromagnets are and what affects their strength.</li> <li>Uses of electromagnets including maglev trains, motors and relays.</li> </ul> <p><u>Skills</u></p> <ul style="list-style-type: none"> <li>Relating observed phenomena to abstract ideas.</li> <li>Modelling a means of explaining electric current.</li> <li>Correctly drawing circuit diagrams.</li> <li>Correctly connecting circuit components and taking measurements using ammeters and voltmeters.</li> </ul>	<ul style="list-style-type: none"> <li>Vocabulary and keywords defined and written in own words.</li> <li>Literacy activities that require and develop reading skills</li> </ul>

					<ul style="list-style-type: none"> <li>• Investigating series and parallel circuits.</li> <li>• Measuring resistance and carrying out resistance calculations.</li> <li>• Observing magnets, taking measurements and plotting a magnetic field.</li> <li>• Constructing and investigating an electromagnet, including taking measurements and displaying them.</li> <li>• Working collaboratively to set up a motor.</li> <li>•</li> </ul>	
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