



Curriculum Map cover sheet

Subject: Physics	Year Group 12/13	Key Stage 5
Links to prior learning Building on all the content from GCSE Science and Physics, this subject delves into the principles behind both our everyday experiences, such as motion, forces and gravity, but then segues into both the unimaginably small realms of quantum physics and the large scale structure and evolution of the Universe.	Retrieval Practice This subject consistently returns to basic concepts taught at the beginning of the course; students retrieve knowledge and apply it via mini whiteboard questions. Student access to Kerboodle resources and quizzes and emphasis within the lesson on how to access these resources. Use of student friendly specification sheets to cross reference student knowledge and progress	Adaptive teaching strategies Difficult concepts can be linked back to basic secondary science, whether by analogy or multiple methods for arriving at some scientific principle. Examples include expanding upon the principle of work and energy, from GCSE Science, to the concepts of electric and gravitational fields. Use of modelling within explanations and examiner reports to build exemplar answers. Writing frames shared with students especially when describing trends in data. Use of strategies such as “think-pair-share” to encourage students to share ideas. End of topic tests are embedded within the teaching sequence with detailed feedback strategies and the opportunity to re-test after student mistakes are highlighted and misconceptions corrected.
Literacy Students will show their deep understanding by	Oracy Use of precise scientific language and logical	Numeracy Physicists become adept at estimation, algebra

explaining physical principles in written responses Specific physics vocabulary, such as the scientific meanings of work or charge, are defined in contrast to their more everyday meanings. Students will be taught to produce detailed worded responses that fully satisfy the question while remaining concise and comprehensible to a lay audience, as good Science communication should be.	arguments is the crux of science and Physics in particular. When a physicist speaks, people listen	and the study of change. We use the tools of trigonometry and calculus, not for some abstract problem-solving, but to describe and master what's real
Careers across the Curriculum Engineering is a popular route for our students for obvious reasons, but many also go on to study maths or computing. With quantum computing the next frontier in computing after AI, in ten years a computer scientist will also be a physicist Students are regularly informed of university taster days and Summer schools related to the study of Physics, including robotics with Imperial University and aeronautical engineering with Cambridge. Students at Queensmead have the opportunity to communicate directly with scientists at CERN in Geneva via the Cern Zone and a range of STEM professionals across industry and academia via our links with I'm a Scientist	Wider Curriculum opportunities Visits to the Diamond Light Source particle accelerator in Oxfordshire, nuclear storage facilities and rocket-building with a visiting NASA engineer have all been enjoyed by A Level Physics students Studying Physics makes one sixth of the A Level Maths course, and one quarter of the Further Maths course trivial Students are invited to take part in the British Physics Olympiad. Full support is given to those students who enter the Physics Aptitude Test or other university entrance exam	Super Curriculum <u>Science Super Curriculum</u>
Assessment and feedback		

A rigorous assessment is given at the end of fifteen major topics over two years. Mock exams take place at the end of Year Twelve and in Year Thirteen, so students are ready for the real thing

Year 12 Physics	Half Term 1	Half Term 2	Half Term 3	Half Term 4	Half Term 5	Half Term 6
Knowledge	Mechanics - Equations of motion - Newton's laws Electricity - Current, resistance and potential difference relationships in series and parallel circuits - Resistivity Working as a Physicist - Base and derived units - Estimation	Mechanics - Conservation of linear momentum - Energy and efficiency Electricity - Potential divider circuits - Internal resistance - Applications of solid-state physics to electrical phenomena Working as a Physicist - Base and derived units - Estimation - Limitations of physical measurement	Materials - Density - Stokes' law - Hooke's law - Force-extension and stress-strain graphs - Elastic strain energy Waves - Wave basics from GCSE - Interference and stationary modes - Refraction Working as a Physicist - Base and derived units - Limitations of physical measurement - Estimation	Particle Nature of Light - Diffraction gratings - de Broglie relationship - Wave particle duality - Photoelectric effect - Atomic line spectra Waves - Lenses - Polarisation - Pulse-echo techniques and information Working as a Physicist - Base and derived units - Limitations of physical measurement - Estimation - Development of scientific ideas over time	Further Mechanics - Impulse - Conservation of momentum in 2D - Circular motion Working as a Physicist - Base and derived units - Limitations of physical measurement - Estimation Exam analysis and consolidation on areas of weakness	Further Mechanics - Circular motion Oscillations - Simple harmonic motion - Resonance - Damping in oscillating systems - Plastic deformation of materials Working as a Physicist - Synoptic treatment of knowledge in HT1-HT6 through novel situations
Numeracy in Physics	- Plotting two variables from experimental data - Calculating rates of change from linear graphs - Determining rates of change from curved graphs - Distinguishing between instantaneous and average rates of change - Use simple techniques to determine uncertainty - Using angles in regular 2D and 3D structures with force diagrams - Use sine, cosine and tangent ratios in physical problems. - Algebraic manipulation - Applying $y = mx + c$ to experimental data	- Plotting two variables from experimental data - Calculating rates of change from linear graphs - Determining rates of change from curved graphs - Distinguishing between instantaneous and average rates of change - Use simple techniques to determine uncertainty - Using angles in regular 2D and 3D structures with force diagrams - Use sine, cosine and tangent ratios in physical problems. - Algebraic manipulation - Applying $y = mx + c$ to experimental data	- Determining slope of linear graph - Calculating and estimating the area under a curve - Appreciating physical significance of area under graph - Use of sine - Use simple techniques to determine uncertainty	- Determining slope of linear graph - Calculating and estimating the area under a curve - Appreciating physical significance of area under graph - Use of sine - Use simple techniques to determine uncertainty - Applying $y = mx + c$ to experimental data	- Translating between degrees and radians - Use of sine, cosine, tangent ratios - Applying $y = mx + c$ to experimental data	- Translating between degrees and radians - Use of sine, cosine, tangent ratios - Applying $y = mx + c$ to experimental data

Year 12 Physics	Half Term 1	Half Term 2	Half Term 3	Half Term 4	Half Term 5	Half Term 6
Practical Skills	- Use appropriate analogue apparatus to record a range of measurements and to interpolate between scale markings - Use methods to increase accuracy of measurements - Use stopwatch or light gates for timing. - Use calipers and micrometers for small distances, using digital or vernier scales - Use ICT such as computer modelling, or data logger with a variety of sensors to collect data, or use of software to process data.	Use appropriate digital instruments, including electrical multimeters, to obtain a range of measurements Correctly construct circuits from circuit diagrams using DC power supplies, cells, and a range of circuit components	- Use appropriate analogue apparatus to record a range of measurements and to interpolate between scale markings - Use appropriate digital instruments, to obtain a range of measurements - Use calipers and micrometers for small distances, using digital or vernier scales.	- Use appropriate analogue apparatus to record a range of measurements and to interpolate between scale markings - Use appropriate digital instruments to obtain a range of measurements - Use signal generator and oscilloscope, including volts/div and time-base - Generate and measure waves, using microphone and loudspeaker, or ripple tank, or vibration transducer, or microwave/radio wave source. - Use laser or light source to investigate characteristics of light, including interference and diffraction.	- Use ICT such as computer modelling, or data logger with a variety of sensors to collect data, or use of software to process data. - Use appropriate analogue apparatus to record a range of measurements and to interpolate between scale markings - Use appropriate digital instruments to obtain a range of measurements	- Use appropriate analogue apparatus to record a range of measurements and to interpolate between scale markings - Use appropriate digital instruments, , to obtain a range of measurements - Use methods to increase accuracy of measurements
Core Practicals	CP1: Acceleration of a free-falling object	CP2: Electrical resistivity CP3: E.m.f and internal resistance of a cell	CP4: Viscosity CP5: Young modulus	CP6: Speed of sound CP7: Factors effecting frequency of vibrating string CP8: Wavelength determination from diffraction grating	CP9: Relationship between force and change in momentum CP10: Use of ICT to analyse simple 2D collisions EXTRA: Determining the form of the pendulum equation	CP16: Determine value of unknown mass using resonant frequencies
Independent Learning Link	Mechanics (Part 1 and Part 2) Electricity	Mechanics (Part 1 and Part 2) Electricity	Waves Materials	Waves	Further mechanics	Further mechanics Oscillations

Year 13 Physics	Half Term 1	Half Term 2	Half Term 3	Half Term 4	Half Term 5	Half Term 6
Knowledge	Fields - Gravitational fields - Electric fields - Magnetic fields - Alternating currents and potential differences Nuclear radiation - Review of GCSE - Fission and fusion - Equations for nuclear decay Working as a Physicist - Base and derived units - Limitations of physical measurement - Estimation - Development of scientific ideas over time	Fields - Gravitational fields - Electric fields - Magnetic fields - Alternating currents and potential differences Capacitors - Capacitors - Applications of capacitors Working as a Physicist - Base and derived units - Limitations of physical measurement - Estimation - Development of scientific ideas over time	Thermodynamics - Ideal gas laws - Black body radiators - Specific heat capacity and specific latent heat Nuclear and particle physics - Atomic structure - Particle accelerators - Standard Model Working as a Physicist - Base and derived units - Limitations of physical measurement - Estimation - Development of scientific ideas over time	Space - Estimating astronomical distances - Life cycles of stars - Redshift - Fate of the universe Revision and exam preparation	Revision and exam preparation	-
Numeracy in Physics	- Sketching relationships modelled by $y = k/n$ and $y = k/n^2$ - Probability - Interpreting log plots	- Solve equations involving rates of change - Using log plots - Interpreting log plots - Algebraic manipulation	- Sketching relationships modelled by $y = k/n^2$ - Unit conversions	Numeracy skills consolidation	Numeracy skills consolidation	-
Practical Skills	- Use appropriate analogue apparatus to record a range of measurements and to interpolate between scale markings. - Use calipers and micrometers for small distances, using digital or vernier scales. - Use ionising radiation, including detectors.	- Use appropriate analogue apparatus to record a range of measurements and to interpolate between scale markings. - Design, construct and check circuits using DC power supplies, cells, and a range of circuit components.	- Use appropriate analogue apparatus to record a range of measurements and to interpolate between scale markings. - Design, construct and check circuits using DC power supplies, cells, and a range of circuit components.	Practical skills consolidation	Practical skills consolidation	-
Core Practicals	CP15: Absorption of gamma radiation by lead	CP11: Capacitor charging and discharging	CP12: Calibrating a thermistor CP13: Determining the specific latent heat of a phase change CP14: Investigating pressure volume relationships			-
Independent Learning Link	Fields and capacitors Nuclear physics	Fields and capacitors Thermodynamics	Standard model Accelerators and detectors	Space IsaacPhysics		-