

Herschel Grammar School
Physics Curriculum Overview 2025/26

Curriculum Intent

From KS3 through to KS5 students need to develop scientific knowledge, enquiry, investigative and analytical skills. The curriculum is structured to allow students to understand the fundamental concepts of Physics and allow them to articulate with precise use of technical terminology in applying their knowledge to a variety of familiar and unfamiliar contexts.

At KS3 our students develop their Physics understanding under the key themes of forces, electromagnets, energy and wave. Students work on key concepts that underpin, understanding how to use equipment correctly to record and report findings and develop the literacy skills needed to support in further key stages. They also apply techniques to improve their numerical skills in Physics.

At KS4 these skills are developed further so students can develop and implement their own scientific investigations in addition to analysing and applying knowledge.

At KS5 our students should be able to design investigations, implement, adapt, analyse and evaluate information as well as transferring information to unfamiliar contexts.

Students are encouraged to be ambitious and ask questions that challenge themselves and their peers.

The Physics curriculum throughout all stages is structured to help students develop their understanding of the subject incrementally and holistically, ensuring the level of challenge is high enough for the most able, with scaffolding and support available for students who need it.

Curriculum Impact

Regular assessments allow us to monitor the progress students make over a period of time and identify those that need intervention and support. Learning conversations occur on a regular basis and feedback is taken into consideration when developing the curriculum. A high number of students choose to continue onto A level Physics at the end of KS4.

Throughout this document, whenever the following icon is used , it indicates that the teaching and learning is linked to one or more of the following:

- nature
- the causes and impacts of climate change
- careers in the green economy
- the importance of sustainability

PHYSICS Curriculum Overview 2025/26

Year Group Plans

Year group	Year 9 (2024/2025)
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Rationale for sequencing (Red – Separate science only)	In Year 9 Pupils, begin learning about the fundamentals of Energy in terms of stores and resources. Understanding the law of conservation and its application in generating electricity. Pupils can then make links to energy in terms of state changes. Pupils will then learn about how objects move (linking to the topics of energy) and will learn about how to graph and analyse objects in motion, in terms of speed, velocity and acceleration – time graphs. Pupils can then make links between an objects motion with the forces exerted on the object using Newtons laws of motion. This is then linked to real world application of road safety using the knowledge of momentum.
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Term 1	
Half term	Half term
P1 Conservation and dissipation of energy P1.1 Changes in energy stores P1.2 Conservation of energy P1.3 Energy and work P1.4 Gravitational potential energy stores P1.5 Kinetic energy and elastic energy stores P10.8 Forces and elasticity <i>RP6 Investigating the relationship between force and extension for a spring</i> PR1- Mini test	P1.6 Energy dissipation P1.7 Energy and efficiency P5.5 Appliances and efficiency P1.8 Electrical appliances P1.9 Energy and power P3 Energy resources P3.1 Energy demands  6marker (QWC)

PHYSICS Curriculum Overview 2025/26

Term 2	
Half term	Half term
P3.2 Energy from wind and water P3.3 Power from the sun and the Earth P3.4 Energy and the environment P3.5 Big energy issues P6.1 Density RP5 Calculating densities P2.1 Energy transfer by conduction Convection PR2 – Mock P1 and P3	P2.2 Infrared radiation P2.3 More about infrared radiation RP10 Investigate infra-red radiation RP2 Investigating thermal insulators P2.5 Heating and insulating buildings  6 marker on Practical Skills
Term 3	
Half term	Half Term
PR3 – P1, P2, P3, P6, P6 Molecules and matter P6.2 States of matter P6.3 Changes of state P2.4 Specific heat capacity RP1 Determining Specific heat capacity P6.4 Internal energy P6.5 Specific latent heat P6.6 Gas pressure and temperature P6.7 Gas pressure and volume	P9 Motion P9.1 Speed and distance-time graphs P9.2 Velocity and acceleration P9.3 More about velocity-time graphs P9.4 Analysing motion graphs P8 Forces in balance P8.2 Forces between objects P8.3 Resultant forces

PHYSICS Curriculum Overview 2025/26

Assessment Plans:	
Term 1	P1 Conservation and dissipation of energy P3 Energy resources
Term 2	P1 Conservation and dissipation of energy P3 Energy resources P2 Energy transfer by heating P6 Molecules and matter (Cumulative testing)
Term 3	P1 Conservation and dissipation of energy P3 Energy resources P2 Energy transfer by heating P6 Molecules and matter P9 Motion P10 Force and motion (Cumulative testing)

PHYSICS Curriculum Overview 2025/26

Year group	Year 10 (2025/2026)
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Rationale for sequencing	Pupils will start Y10 with electric circuits, learning about the different aspects of electrical circuits through theory and practicals. They will then link electrical circuits to electricity in the home. Pupils will then be able to make links to electromagnetism, in which pupils will understand electrical current running through a wire produces a magnetic field. This proceeds onto motor and generators which have links to electrical stores and how electricity is generated in a power station which is learnt in year 9. Pupils can then make links to waves and electromagnetic waves, in terms of what they are made up of. Understanding the different properties of waves as well as knowing the properties of the different types of electromagnetic radiation.
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Term 1	
Half term	Half term
Review - P8 Forces in balance P8.2 Forces between objects P8.3 Resultant forces P10 Force and motion P10.1 Force and acceleration <i>RP7 Investigate the relationship between force and acceleration</i> P10.2 Weight and terminal velocity P10.3 Forces and braking P10.4 Momentum P10.5 Using conservation of momentum P10.6 Impact forces P10.7 Safety first	P4 Electric circuits P4.1 Electrical charges and fields P4.2 Current and charge P4.3 Potential difference and resistance P4.4 Component characteristics <i>RP4 Investigating electrical components</i> P4.5 Series circuits P4.6 Parallel circuits <i>RP3 Investigating resistance</i> PR1- P4 P5 Electricity in the home PR1 Electricity test P5.1 Alternating current P5.2 Cables and plugs
Term 2	
Half term	Half term

PHYSICS Curriculum Overview 2025/26

PR2 – P4 and P5 P5.3 Electrical power and potential difference P5.4 Electrical currents and energy transfer P15 Electromagnetism P15.1 Magnetic fields P15.2 Magnetic fields of electric currents P15.3 Electromagnets in devices P15.4 The motor effect P15.5 The generator effect P15.6 The alternating-current generator P15.7 Transformers P15.8 Transformers in action	P12 Wave properties/P14Light P12.1 The nature of waves P12.2 The properties of waves P12.3 Reflection and refraction P14.1 Reflection of light P14.2 Refraction of light P14.3 Light and colour <i>RP9 Investigate the reflection and refraction of light</i> PR3 P4 P5 P15 + P12
Term 3	
Half term	Half Term
P14.4 Lenses P14.5 Using lenses P12 Wave properties/P13 Electromagnetic waves P12.4 More about waves <i>RP8 Investigate planes waves in a ripple tank and waves in a solid</i> P12.7 Seismic waves P12.5 Sound waves P12.6 The uses of ultrasound	P13.1 The electromagnetic spectrum P13.2 Light, infrared, microwaves and radio waves  P13.3 Communications P13.4 UV, X-rays and Gamma rays P13.5 X-rays in medicine Summary questions from P12/13

PHYSICS Curriculum Overview 2025/26

Assessment Plans:	
Term 1	P4 Electric circuits P5 Electricity in the home
Term 2	P4 Electric circuits P5 Electricity in the home P15 Electromagnetism P12 Wave properties/P14Light (Cumulative testing)
Term 3	P4 Electric circuits P5 Electricity in the home P15 Electromagnetism P12 Wave properties/P14Light P13 Electromagnetic waves P7 Radioactivity (Cumulative testing)

PHYSICS Curriculum Overview 2025/26

Year group	11 (2025/2026)
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Rationale for sequencing	Year 11 starts off with learning about forces in balance in terms of Vectors, which then links into how forces can cause rotational motion. We will use ideas about forces to link them with Pressure in solids and fluids. The last module will be Space, which allows pupils to use their vast knowledge of Physics to link ideas together to understand how celestial bodies have formed, as well the key ideas behind how the universe started and how it may end.
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Term 1	
Half term	Half term
P7 Radioactivity P7.1 Atoms and radiation P7.2 The discovery of the nucleus P7.3 Changes in the nucleus P7.4 More about alpha, beta and gamma radiation P7.5 Activity and half life P7.6 Nuclear radiation in medicine P7.7 Nuclear fission P7.8 Nuclear fusion P7.9 Nuclear issues 	P8 Forces in balance P8.1 Vectors and scalars P8.8 The parallelogram of forces P8.9 Resolution of forces P8.6 Centre of mass P8.4 Moments at work P8.7 Moments and equilibrium P8.5 More about levers and gears

PHYSICS Curriculum Overview 2025/26

Term 2	
Half term	Half term
Mock 2 P11 Pressure and surfaces P11 Force and pressure P11.1 Pressure and surfaces P11.2 Pressure in a liquid at rest P11.3 Atmospheric pressure P11.4 Upthrust and floatation	P16 Space Revision of all Modules from year 9-11 P16.1 Formation of the solar system P16.2 The life history of a star P16.3 Planets, satellites and orbits P16.4 The expanding universe P16.5 The beginning and future of the universe
Term 3	
Half term	Half Term
Revision of all Modules from year 9-11	Revision of all Modules from year 9-11

Key Assessment Plans:	
Term 1	P8 Forces in balance P11 Pressure and surfaces Cumulative testing of prior topics
Term 2	Paper 1 Topics 1-4: Energy; Electricity; Particle model of matter; and Atomic structure
Term 3	Paper 1 - Topics 1-4: Energy; Electricity; Particle model of matter; and Atomic structure Paper 2 - Topics 5-8: Forces; Waves; Magnetism and electromagnetism; and Space physics

PHYSICS Curriculum Overview 2025/26

Year group	12
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Rationale for sequencing	Year 12's start with the basics of understanding quantities and units which they will use throughout the course. After which they will start their journey into mechanics and the uses of forces. We will be using the knowledge of mechanics to then go into non-linear motion and look at circular motion which has links to oscillating motion. Having this understanding first is essential to then proceed with looking at electricity as well as electric and magnetic fields. Allowing pupils to take their knowledge of circular motion and be able to apply it to how charges move within a field. This then nicely links to how electricity can be generated looking at the effects of moving charges within a changing to field.
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Term 1	
Half term	Half term
Module 2 Foundations of Physics 2.1 Physics quantities, units and measurements 2.1.1- Physics quantities and units 1.1.2- Implementation of practical work- getting familiar with equipment used at A level 2.1.2 Estimating physics quantities 2.1.3 Systematic and Random errors 2.1.4 Precision and Accuracy 2.1.5 Absolute and % uncertainties 2.1.6 Graphical treatment of errors. Mini test- errors 2.2 Nature of quantities 2.2.1. Scalar and Vector quantities 2.2.2. Scalar and vector calculations 2.2.3 Resolving vectors 3.2.4 Equilibrium Module 3 Forces and motion 3.1 Motion	3.2 Forces in action 3.2.1 Force and the Newton 3.2.6. Centre of mass 3.2.2 Dynamics- force diagrams 3.2.5 Turning forces 3.2.8 Pressure 3.2.3 Drag and terminal velocity PAG 1.2- Investigating T. Velocity 3.2.7 Density and Upthrust (Archimedes) 3.5 Newton's Laws of motion 3.5.1 Newton's 3 Laws of motion 3.5.2 Momentum 3.5.3 Momentum, force and impulse 3.5.4 Elastic and inelastic collisions 5.2 Circular motion 5.2.1 Kinematics of circular motion 5.2.2 Centripetal force Force diagrams to determine $F_{net} = F_{centripetal}$ – Mathematical skills- trigonometry required

PHYSICS Curriculum Overview 2025/26

3.1.1 Definitions in kinematics 3.1.2 Graphs of motion intro 3.1.3 Constant acceleration equations (suvat) 3.1.6 Car stopping distances PAG 1.3 Investigating stopping distance 3.1.4 Free fall (Projectile motion) 3.1.5 Measurement of g PAG 1.1- Determining g – use 2/3 methods – G ball , 2 light gates and manual method with timer (option of slow motion camera) 3.1.4 Projectile motion Practical - Ramp launcher Module 3 3.4 Materials 3.4.1 Deformation of materials 3.4.2 Hooke's Law PAG 2.2- Force/extension characteristics using arrangements of springs 3.4.3 The Young Modulus PAG 2.1- Young's modulus 3.4.4 Categorization of materials PR1 – October test PAG REVIEW	5.3 Oscillations 5.3.1 Simple harmonic motion 5.3.2 The equations of simple harmonic motion 5.3.3 Graphical analysis of simple harmonic motion 5.3.4 Energy of a simple harmonic oscillator 5.3.5 Damping 5.3.6 Resonance PAG 10.1 - Factors affecting SHM – using pendulum to find g (practice), using oscillating mass to find K PAG 10.2 Observing forced and damped oscillations Test3 - Practical and Mathematical skills in Physics + Mechanics + Kinematics PAG REVIEW
Term 2	
Half term	Half term
3.3 Work energy and power 3.3.2 Conservation of energy 3.3.3 Potential and kinetic energy 3.3.1 Work and the joule 3.3.4 Power and the Watt 4.2.6 Electrical power 3.3.5 Efficiency 4.2.7 Cost of electrical energy  Module 4 Electricity- 4.1 Charge and current and 4.3 Electrical circuits 4.1.2. Electric current and Charge 4.3.1 Kirchhoff's 1st law 4.1.3. Electron drift velocity 4.2.1 PD and EMF 4.3.1 Kirchhoff's 2nd Law 4.2.2. Resistance and Ohm's Law 4.3.2. Series circuits 4.3.3. Parallel circuits	PR2 - Test Electricity- 4.2 Energy power and resistance 4.1.1. Electric circuit components 4.2.4. Resistivity 4.2.5 The effect of temp in resistivity PAG 3.1 Resistivity 4.2.3 Resistance of circuit components PAG 4.3- Investigating potential divider with ohmic and non-ohmic conductors 4.3.5 Internal resistance PAG 3.3 Investigate the internal resistance of a cell 4.3.6 Circuit Analysis 1 4.3.7 Circuit Analysis 2 PAG 4.2- Circuits with more than one source of EMF Module 6 6.2 Electric fields 6.2.1 Electric fields

PHYSICS Curriculum Overview 2025/26

4.3.4 The potential divider PAG 4.1 Investigating resistance combinations and potential dividers PAG REVIEW	6.2.2 Coulomb's law 6.2.3 Uniform electric fields 6.2.4 Electric potential and electric potential energy Practical and Mathematical skills in Physics + MCQ PAG REVIEW
Term 3	
Half term	Half Term
6.1 Capacitors 6.1.1 Capacitors 6.1.2 Capacitors in series and parallel 6.1.3 Energy stored in a capacitor 6.1.4 Charging and discharging capacitors 6.1.5 Graphical and spreadsheet methods PAG 9.1- Charging and discharging capacitors PAG 9.2- Capacitors in series and parallel PAG 9.3 – Investigating factors affecting the Capacitance of a Capacitor 6.3 Electromagnetism 6.3.1 Magnetic fields 6.3.2 Magnetic flux and magnetic flux density 6.3.3 Forces on a current carrying wire 6.3.4 Motion of charged particles in magnetic and electric fields 6.3.5 Electromagnetic induction 6.3.6 Faraday's law and Lenz's law 6.3.7 The a.c. generator 6.3.8 Transformers  PAG 11.3- Determining the magnetic field of a magnet PAG 11.1- Investigating Transformer PAG REVIEW	Year 1 content reviewed Exam Practice PAG Catchup If time continue with Year 2 content Mock test (in the style of modelling, exploring and unified) Practical and Mathematical skills in Physics + MCQ PAG REVIEW

PHYSICS Curriculum Overview 2025/26

Key Assessment Plans:	
Term 1	2.1 Physics quantities, units and measurements 2.2 Nature of quantities 3.1 Motion 3.4 Materials 3.2 Forces in action 3.5 Newton's Laws of motion 5.2 Circular motion 5.3 S.H.M.
Term 2	Cumulative testing of Term 1 topics with addition of: 3.3 Work energy and power 4.1 Charge and current and 4.3 Electrical circuits 4.2 Energy power and resistance 6.2 Electric fields
Term 3	Cumulative testing of Term 1 and 2 topics with addition of: 6.1 Capacitors 6.3 Electromagnetism Mock test (in the style of modelling, exploring and unified)

PHYSICS Curriculum Overview 2025/26

Year group	13
Rationale for sequencing	We start Yr13 with Waves and their properties which has many ties to what they learn at GCSE. We look at waves in more depth in terms of how waves can interfere with one another. Then looking at light in terms of waves and particles which allows us to understand the quantum effects of light. We then move on to gravitational fields and astrophysics, looking at how the physics that has been learnt so far can be applied to understanding how celestial bodies move and understanding how to measure distance of stars from their luminosity. We then begin to look at thermal physics and nuclear physics to understand how atoms behave, moreover, understanding how scientist use this knowledge to generate electricity in a safe manner. Lastly we look at medical physics and combine the physics that has been learnt to understand the different ways medical images can be produced.

Term 1	
Half term	Half term
PR1 Data - UCAS Module 4 Waves 4.4 Waves 4.4.1 Wave motion – Transverse and longitudinal+ EM and Mechanical (include representing longitudinal waves graphically- see Kerboodle book diagram) 4.4.5 – EM waves – must learn typical wavelengths – practice MCQ 4.4.2 Wave terminology- Phase and path difference, amplitude, period, displacement 4.4.9 Interference 4.4.10 Young’s double slit – wavelength Demo- Use multiple fringes and travelling microscope 4.4.11 The diffraction grating – wavelength accurately PAG 5.1- Wavelength of light with diffraction grating 4.4.6 Polarisation PAG 6.3- Experiments with polarisation	4.5 Quantum Physics 4.5.2 The electron volt- The small unit of energy 5.5.1 The photon – Electron energy vs Photon energy proportionality: Planck’s constant PAG 6.1- - Planks constant 4.5.3 The photoelectric effect 1 – Einstein’s Equation- Photon energy vs electron energy 4.5.4 The Photoelectric effect 2- Stopping potential 4.5.5 Wave particle duality- Electrons behaving as waves 5.4 Gravitational fields 5.4.1 Gravitational fields 5.4.2 Newton’s law of gravitation 5.4.3. The motion of planets and satellites 5.4.4 Gravitational potential and gravitational potential energy Satellites question practice

PHYSICS Curriculum Overview 2025/26

4.4.4 Common properties of waves- refraction and reflection PAG 6.2- Experiments with light 4.4.12 Stationary waves –water stationary waves videos and animations 4.4.3 Wave speed and wave speed equation Demo- Speed of the progressive waves that form a stationary wave in a string wave 4.4.14 Stationary longitudinal waves 4.4.13 Stationary wave experiments PAG 5.2 – Speed of sound with resonance tube PAG 5.3- Frequency and amplitude of sound using an oscilloscope PAG REVIEW	5.5 Astrophysics and cosmology 5.51 The structure of the universe 5.52 Star formation and life cycle 5.5.3 Electromagnetic radiation from stars 5.5.4 Wien’s law and Stefan’s law 5.5.5 Astronomical distances 5.5.6 The Doppler effect and ref shift 5.5.7 The microwave background and cosmological principle 5.5.8 The evolution and expansion of the universe 5.5.9 Dark matter and dark energy PAG 12.2- Research Report – referencing skill Mock test (in the style of modelling, exploring and unified) PAG REVIEW
Term 2	
Half term	Half term
PR2/3 Test 5.1 Thermal Physics 5.1.1 Temperature 5.1.2 Solids, liquids and gases 5.1.3 Internal energy 5.1.4 Brownian motion 5.1.5 SHC 5.1.6 Specific latent heat 5.1.7 Amount of substance 5.1.8 Kinetic theory and pressure of a gas 5.1.9 Boyles law 5.1.10 Ideal gas equation 5.1.11 Boltzmann constant PAG 8.1 Estimate the absolute zero from gas pressure and volume PAG 8.2- Investigating the relationship between pressure and Volume PAG 8.3 Investigating the Work done by a gas as temperature increases PAG11.2- Determining the SHC of a material PAG REVIEW	Module 6 6.4 Nuclear and Particle Physics 6.4.1 The nuclear atom 6.4.2 The strong nuclear force 6.4.3 Nuclear density 6.4.4 Fundamental particles 6.4.5 Radioactivity 6.4.6 Radioactive decay 6.4.7 Radioactive decay equations and half-life 6.4.8 Radioactive dating 6.4.9 Mass energy conservation 6.4.10 Nuclear fission  6.4.11 Nuclear fusion 6.5 Medical imaging 6.5.1 X-rays 6.5.2 Attenuation of X-rays 6.5.3 Computerised axial tomography (CAT) 6.5.4 The gamma camera 6.5.5 Positron emission tomography (PET) 6.5.6 Ultrasound 6.5.7 Acoustic impedance 6.5.8 The Doppler effect PAG REVIEW

PHYSICS Curriculum Overview 2025/26

Term 3	
Half term	Half Term
Year 1 and Year 2 content reviewed Exam Practice PAG Catchup	

Key Assessment Plans:	
Term 1	Cumulative testing of Year 1 topics with addition of: 4.4 Waves 4.5 Quantum Physics 5.4 Gravitational fields 5.5 Astrophysics and cosmology Mock test (in the style of modelling, exploring and unified)
Term 2	Cumulative testing of Year 1 topics with addition of: 4.4 Waves 4.5 Quantum Physics 5.4 Gravitational fields 5.5 Astrophysics and cosmology 5.1 Thermal Physics 6.4 Nuclear and Particle Physics 6.5 Medical imaging
Term 3	Paper 1 - Modelling physics Paper 2 - Exploring physics Paper 3 - Unified physics