



THE BROMFORDS SCHOOL
ACHIEVE ENRICH PREPARE

The Bromfords School

Science Faculty.

Intent of Physics Curriculum



The intent of Physics in Science at Bromfords is the systematic study of the physical and natural world through observations and experimentation. Our intent is to make students scientifically literate in order to make sense of information and to communicate their ideas to contribute to a better and more advanced world.

Achieve:

Students are supported and challenged to think scientifically. To be inquisitive and pose genuine investigative questions. Through problem solving approaches they will use experimental observations to deepen their understanding.

Enrich:

To offer a blend of independent investigation and team working skills to explore and suggest solutions to real world problems. To help students be better members of society through a deeper understanding of how science works, and consequently help students make better life decisions. Enable students to acquire accurate information about the natural world and about society and culture.

Prepare:

To re-visit key skills in real world contexts. Allow students to reflect on the purpose of the topic in the bigger picture of how the world works and future career opportunities. Students are aware of implications of actions through application of real science.

Department: Physics	Curriculum Map What does Physics within the Science Faculty at Bromfords look like?					
Entry KS2	Year 7	Year 8	Year 9	Year 10	Year 11	Post-16
<p><u>Knowledge:</u></p> <p>States of Matter Water Cycles Properties and testing materials Dissolving & separating materials Reversible and irreversible reactions Basic particle theory</p> <p><u>Skills:</u></p> <ul style="list-style-type: none"> - Set up simple practical enquiries which are fair tests. - Report on findings from enquiries including oral and written explanations, based on graphical data. - Plan different types of scientific enquiries to answer questions 	<p>Knowledge:</p> <ul style="list-style-type: none"> - Forces - Sound & light waves - Space <p>Skills:</p> <p>Understand scientific keywords.</p> <p>Following teacher guidance to draw graphs and practical diagrams</p> <p>Understand that models are used to help explain scientific ideas.</p> <p>Working as part of a team to investigate the impact of different variables on experiments</p>	<p>Knowledge:</p> <ul style="list-style-type: none"> - Electricity & magnetism - Energy - Motion & pressure <p>Skills:</p> <p>Use scientific keywords in their writing.</p> <p>Independently solve scientific calculations.</p> <p>Independently draw graphs and circuit diagrams</p> <p>Understand that models are used to help explain scientific ideas.</p> <p>interpret distance time graphs</p> <p>Working as part of a team to identify and investigate the impact of different variables on experiments</p>	<p>Knowledge:</p> <ul style="list-style-type: none"> - Energy & electricity - Forces & Speed - Surviving in space <p>Skills:</p> <p>Use more ambitious scientific keywords in their writing.</p> <p>Following teacher guidance solve multi-step calculations.</p> <p>Describe trends shown in graphs</p> <p>Refer to models in explanations.</p> <p>Enhanced mathematical skills in preparation for KS4</p> <p>Working as part of a team to identify, investigate and predict the impact of different variables on experiments</p>	<p>Knowledge:</p> <ul style="list-style-type: none"> - Energy - Electricity - States of matter - Atomic structure - Radiation <p>Skills:</p> <p>Describe scientific keywords in extended writing.</p> <p>Independently solve multi-step calculations.</p> <p>Create circuit diagrams to investigate resistance</p> <p>Use science to explain trends shown in graphs.</p> <ul style="list-style-type: none"> - Refer to models in explanations and how models change over time. <p>Analyse data from graphs and tables</p> <p>Understand and express opinions based on scientific reasoning.</p> <p>Working independently to identify, investigate and predict the impact</p>	<p>Knowledge:</p> <ul style="list-style-type: none"> - Forces and their effects - Forces and motions - Car safety & moment - Waves & electromagnetic spectrum - Magnetism & electromagnetism - Space (Physics separate science) <p>Skills:</p> <p>Link scientific keywords and concepts together in extended writing.</p> <p>Recall, rearrange and solve calculations independently.</p> <p>Use science and data to explain trends shown in graphs.</p> <p>Evaluate scientific models</p> <p>Interpret graphs and diagram to explain the effect of forces on objects.</p> <p>Analyse data from graphs and tables</p>	<p>Knowledge:</p> <ul style="list-style-type: none"> - Particles and radiation - Waves - Further mechanics & materials - Electricity - Fields & their consequences - Nuclear physics - Extended research of optional topic <p>Skills:</p> <p>Develop practical skills to confidently work independently to identify, research, investigate and predict the impact of different variables on experiments (CPAC)</p> <p>Evaluate and use scientific models to explain concepts</p> <p>Practical application to understand and explain key processes and their impact.</p> <p>Explore the nuclear industry and evaluate the impact based on scientific research</p>

				of different variables on experiments	Understand and express opinions based on scientific reasoning. Working independently to identify, investigate and predict the impact of different variables on experiments.	Link scientific keywords and concepts together in scientific essay.
Enrichment, Careers, Real-world Experience.	<p>Opportunities to link knowledge to careers through lessons.</p> <p>Explore how waves are used in the real world focusing on lenses, echoes and ultrasounds.</p> <p>Understanding the interactions and impacts of different forces on the real world.</p> <p>Gain an understanding of our place in the solar system.</p> <p>Science clubs and trips are run periodically on the availability of local and national competitions e.g., National Rocket Launch Competition</p>	<p>Opportunities to link knowledge to careers through lessons.</p> <p>To demonstrate an understanding of key ideas of electricity and how it is generated and distributed.</p> <p>Introduction to renewable and non-renewable energy resources.</p> <p>Understand the importance and impact of pressure in travel.</p> <p>Science clubs and trips are run periodically on the availability of local and national competitions e.g., National Rocket Launch Competition</p>	<p>Opportunities to link knowledge to careers through lessons.</p> <p>Develop understanding of renewable and non-renewable energy resources and their environmental impact.</p> <p>Understand the impacts of changing forces on speed and direction in relation to driving.</p> <p>Exposure to current developments in space travel.</p> <p>Science clubs and trips are run periodically on the availability of local and national competitions e.g., National Rocket Launch Competition</p>	<p>Opportunities to link knowledge to careers through lessons.</p> <p>To demonstrate an understanding of key ideas of electricity and how it is generated and distributed and how we are able to meet demands of electricity.</p> <p>Understand the domestic uses and safety features in mains electricity.</p> <p>Science clubs and trips are run periodically on the availability of local and national competitions e.g., National Rocket Launch Competition</p>	<p>Opportunities to link knowledge to careers through lessons.</p> <p>Explore safety features of cars and the impact of thinking distance on stopping distance and the responsibility of the driver.</p> <p>STEM activities and sessions enthuse students to consider a career in the STEM field.</p> <p>Science clubs and trips are run periodically on the availability of local and national competitions e.g., National Rocket Launch Competition</p>	<p>Students continue to expand their skills in using advanced practical equipment in science lab settings.</p> <p>Opportunities to link knowledge to careers through lessons.</p> <p>Several excursions to University providers to enlighten students to the variety of FE options available including vocational and apprenticeships.</p> <p>Assessed practical work supports knowledge and skill delivery.</p>
	Careers & Real-World: Engineer, astrophysicist, electrician, nuclear physicist, experimental physicist, opticians, radiographer, medical imaging practitioners, naval officer/professional/operators, health and safety officers.					

Year 7 – Intent: Engage and enthuse students in the application of Science (including literacy and numeracy skills). To gain understanding of it in a physical and natural world.

Term 1a		Term 1	Term 2	Term 3
Scheme of Work: Year 7 Transition to Science (revised July 2022)		Scheme of Work: P1 Forces	Scheme of Work: P2 & P3 Sound and Light	Scheme of Work: P4 Space
Learning Intent: To capture prior knowledge of students and explore the purpose of Science through the development of practical skills.		Learning Intent: To understand forces, their interactions and their impact on the real world	Learning Intent: To understand the properties of waves in order to compare and contrast light and sound	Learning Intent: To understand the Solar System and its (and our) place in the universe
Measuring Impact through:	Baseline assessment	Measuring Impact through:	AFL and internal assessment practices. These include detailed and levelled end of topic tests and short individual topic-based assessments where appropriate	

Year 8 – Intent: Engage and enthuse students in the application of Science (including literacy and numeracy skills). To gain understanding of it in a physical and natural world. Students have the opportunities to develop practical skills and to apply to real world problems.

Term 1	Term 2	Term 3
Scheme of Work: P1 Electricity and magnetism	Scheme of Work: P2 Energy	Scheme of Work: P3 Motion and Pressure
Learning Intent: To demonstrate an understanding, both physically and conceptually, of key ideas within electricity, and how it is generated.	Learning Intent: To learn the true nature of energy and methods of energy transfer applying the particle theory.	Learning Intent: To use mathematical skills to understand motion and pressure.
Measuring Impact through:	AFL and internal assessment practices. These include detailed and levelled end of topic tests and short individual topic-based assessments where appropriate	

Year 9 – Intent: Expose students to the developing nature of learning resources, including the implications of use. Building on prior knowledge to tackle more complex problems. Continue to use analytical skill and interpret data in readiness for Key Stage 4 Curriculum, which commences in Term 3.

Term 1	Term 2	Term 3
<p>Scheme of Work: 9pa – Energy and Electricity</p> <p>Learning Intent: Modelling and comparing of data on energy consumption over time and how it looks in the future whilst answering the question ‘How do we adapt our use of energy resources to cope with a modern world?’</p>	<p>Scheme of Work: 9pb – Forces and Speed</p> <p>Learning Intent: Identify how Maths and Physics overlap and enhance mathematical skills in preparation for KS4 studies, whilst focusing on physical interactions of objects near each other.</p>	<p>Scheme of Work: 9pc – Surviving in Space</p> <p>Learning Intent: Extending knowledge of Fundamental Physics concepts that help us explain motion and effects on our bodies in space whilst answering the question can humans travel to and colonise Mars?’</p>
Measuring Impact through:	AFL and internal assessment practices. These include detailed and levelled end of topic tests and short individual topic-based assessments where appropriate	

Year 10– Intent: Enhance knowledge on matter, energy, and the interaction between them. Analyse results from fundamental questions and/or observe and experiment with scientific equipment to prove/disprove laws. Students will be able to demonstrate how the laws of Physics enhance our lifestyle and identify the advantages and disadvantages to certain technological advances through time. They will be able to apply this knowledge to further their studies in Physics or in employment. The future decisions on environmental impact of technology and industry are made based upon factual knowledge and learning.

Term 1	Term 2	Term 2/3	Term 3
<p>Scheme of Work: P1 Energy Transfers and Energy Resources</p> <p>Learning Intent: To scientifically evaluate the sources, stores and transfers of energy in the physical world.</p>	<p>Scheme of Work: P2 Circuits and Domestic Electricity</p> <p>Learning Intent: Understand how the generation and application of electricity contributes to the inner workings of every day modern appliances.</p>	<p>Scheme of Work: P3 Particle model of matter</p> <p>Learning Intent: Students will be able to give examples to show how scientific methods and theories have changed over time. They will be able to explain, with an example, why new data from experiments or observations led to changes in models or theories. They will then be able to decide whether given data supports a particular theory.</p>	<p>Scheme of Work: P4 Atomic structure</p> <p>Learning Intent: Students will be able to use models in explanations, or match features of a model to the data from experiments or observations that the model describes or explains. They will be able to make predictions or calculate quantities based on the model or show its limitations.</p>
Measuring Impact through: Individual end of unit internal tests (50 Marks) and in Paper 1 of external exam in Year 11. In class AFL activities			

Year 11– Intent: Enhance knowledge on matter, energy, and the interaction between them. Analyse results from fundamental questions and/or observe and experiment with scientific equipment to prove/disprove laws. Students will be able to demonstrate how the laws of Physics enhance our lifestyle and identify the advantages and disadvantages to certain technological advances through time. They will be able to apply this knowledge to further their studies in Physics or in employment. The future decisions on environmental impact of technology and industry are made based upon factual knowledge and learning.

Term 1		Term 1/2		Term 2	Term 3
Scheme of Work: P5(a&b) Forces and Elasticity	Scheme of Work: P5(c&d) Motion, Car safety and Momentum	Scheme of Work: P6 (a&b) Waves and the Electromagnetic Spectrum	Scheme of Work: P6(c&d) Lenses and other waves (Physics only)	Scheme of Work: P7 Magnetism and Electromagnetism	Scheme of Work: P8 Space physics (Physics only)
Learning Intent: Be able to analyse forces in the way that engineers do when designing a great variety of machines and instruments, from road bridges and fairground rides to atomic force microscopes. Apply the knowledge to real life context like recent developments in how artificial limbs use the analysis of forces to make movement possible.	Learning Intent: Students will be able to link learning to the motion of vehicles and assess how factors affect the stopping distance through analysis of data. Students are more informed about safety systems in readiness for them to leave school and learn to drive, or even make choices about transport based on scientific reasoning.	Learning Intent: Relate wave behaviour in both natural and man-made systems. Recognise that waves carry energy from one place to another and can also carry information. Explore how the design of comfortable and safe structures such as bridges, houses and music performance halls requires an understanding of mechanical waves. Modern technologies such as imaging and communication systems show how we can make the most of electromagnetic waves. Identify our dependency including risks on the use of EM Waves.	Learning Intent: Identify how lenses are used in different context. Students will be able to predict the image based upon the structure and shape of a lens. Students will be able to calculate the magnification through measurement and data analysis. Students will be able to relate colour in transmission of wavelengths of energy, including the use of filtering.	Learning Intent: Identify the uses and how electromagnetic effects are used in a wide variety of devices. Understand that engineers make use of the fact that a magnet moving in a coil can produce electric current and also that when current flows around a magnet it can produce movement. Explain how systems that involve control or communications take full advantage of these phenomena.	Learning Intent: To answer questions based upon evidence and data provided. Students will be able to explain how the evidence for our existence is based upon technological advances. Facts about evolution and structure of matter in the cosmos is explored and students get to apply the principles based upon data analysis.
Measuring Impact through: Individual end of unit internal tests (50 Marks) and in Paper 2 of external exam in Year 11. In class AFL activities					

Year 12– Intent: To develop a deeper interest in Physics, enabling further study and/or careers associated with it. Students get to demonstrate a deep appreciation of the skills, knowledge and understanding of scientific methods. Their greater understanding will help them understand how society makes decisions about scientific issues based upon validated new knowledge and how the sciences contribute to the success of the economy and society. Students will be more able to recognise and help to contribute to a reduction in the risks of these applications through evaluating methodology, evidence and data, and resolving conflicting evidence. Carry out experimental and investigative activities, including appropriate risk management, in a range of contexts.

Term 1		Term 2 & 3		Term 1,2,3 Fundamental skills and processes Year 12 and 13
Scheme of Work: Particles and Radiation Learning Intent: Introduces students both to the fundamental properties of matter, and to electromagnetic radiation and quantum phenomena. Students become aware of the way ideas develop and evolve in physics. Appreciate the importance of international collaboration in the development of new experiments and theories in this area of fundamental research.	Scheme of Work: Waves Learning Intent: GCSE studies of wave phenomena are extended through a development of knowledge of the characteristics, properties, and applications of travelling waves and stationary waves. Greater knowledge of refraction, diffraction, superposition and interference will increase understanding of applications in modern society.	Scheme of Work: Mechanics and Materials Learning Intent: Development of the knowledge and understanding of forces, energy and momentum. A study of materials considered in terms of their bulk properties and tensile strength. To provide a good starting point for students who are seeking careers in Engineering.	Scheme of Work: Electricity Learning Intent: Build on and develop earlier study of these phenomena from GCSE. Provide opportunities for the development of practical skills and lay the groundwork for later study of the many electrical applications that are important to society.	Scheme of Work: Measurements and their errors Learning Intent: (Content in this section is a continuing study for a student of physics throughout years 12 and 13). Gain a working knowledge of the specified fundamental (base) units of measurement. Develop a greater skill in practical work based upon subject needs, which are underpinned by an awareness of the nature of measurement errors and of their numerical treatment.
<i>Measuring Impact through: Internal assessments and Final Exam performance on Paper 1. CPAC skills will be assessed as an ongoing exercise</i>				<i>Measuring Impact through: Internal assessments and Final Exam performance on Paper 3. CPAC skills will be assessed as an ongoing exercise</i>

Year 13– Intent: To develop a deeper interest in Physics, enabling further study and/or careers associated with it. Students get to demonstrate a deep appreciation of the skills, knowledge and understanding of scientific methods. Their greater understanding will help them understand how society makes decisions about scientific issues based upon validated new knowledge and how the sciences contribute to the success of the economy and society. Students will be more able to recognise and help to contribute to a reduction in the risks of these applications through evaluating methodology, evidence and data, and resolving conflicting evidence. Carry out experimental and investigative activities, including appropriate risk management, in a range of contexts.

Term 1		Term 2/3		Term 1,2,3 Fundamental skills and processes Year 12 and 13
<p>Scheme of Work: Further Mechanics and Thermal Physics</p> <p>Learning Intent: Earlier study of mechanics is further advanced through a consideration of circular motion and simple harmonic motion (the harmonic oscillator). Thermal properties of materials, the properties and nature of ideal gases, and the molecular kinetic theory to be studied in depth preparing learners for a career in Engineering or Physics.</p>	<p>Scheme of Work: Fields and their consequences</p> <p>Learning Intent: Explore the ideas of gravitation, electrostatics and magnetic field theory and emphasise this unification between each phenomenon. Further develop ideas from earlier studying of Physics and in particular, mechanics and electricity. Practical applications considered include: planetary and satellite orbits, capacitance and capacitors, their charge and discharge through resistors, and electromagnetic induction. To identify how these topics have considerable impact on modern society.</p>	<p>Scheme of Work: Nuclear Physics</p> <p>Learning Intent: Build on the work of Particles and radiation to link the properties of the nucleus to the production of nuclear power through the characteristics of the nucleus, the properties of unstable nuclei, and the link between energy and mass. Students should become aware of the physics that underpins nuclear energy production and also of the impact that it can have on society. Explore the advantages and disadvantages of Nuclear industry based upon scientific research.</p>	<p>Scheme of Work: Optional Unit</p> <p>Learning Intent: To extend knowledge on one of the following units (based upon the needs of the cohort): Astrophysics Medical Physics Engineering Physics Turning Points in Physics Electronics</p>	<p>Scheme of Work: Measurements and their errors</p> <p>Learning Intent: (Content in this section is a continuing study for a student of physics throughout years 12 and 13). Gain a working knowledge of the specified fundamental (base) units of measurement. Develop a greater skill in practical work based upon subject needs, which are underpinned by an awareness of the nature of measurement errors and of their numerical treatment.</p>
<p><i>Measuring Impact through: Internal assessments and Final Exam performance on Paper2. CPAC skills will be assessed as an ongoing exercise</i></p>				<p><i>Measuring Impact through: Internal assessments and Final Exam performance on Paper3. CPAC skills will be assessed as an ongoing exercise</i></p>

