KING EDWARD VI
CAMP HILL
SCHOOL FOR BOYS

King Edward VI Camp Hill School for Boys

Physics

Department Handbook

2025-26

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Department intent, implementation and impact:

Curriculum Intent:

- Introduce students to scientific investigations through experimentation and evaluation
- Provide opportunities for pupils to critically assess the real world based on fact-driven views
- Cultivate the use of academic terminology in the process of learning new knowledge in order to develop pupils' scientific literacy
- Develop the ability to comprehend science through real-life observations, scientific principles and logic
- Build up channels for pupils to access the wider scientific world through the familiarisation of basic scientific principles
- Apply and develop numeracy skills alongside scientific investigations and establish the key roles played by mathematics in building physical models
- Develop the independence and resilience when encountering complex concepts and solving challenging problems
- Nurture and entrench scientific and critical thinking skills into the day-to-day learning routines

Curriculum Implementation:

- The department delivers a large number of well-designed class practicals from Year 7 to Y11
- The curriculum provides a wide breath in KS3 as well as opens discussions for further investigations in KS4
- The scheme of work is designed to suit our pupils' intellectual ability at different stages but also offers an opportunity to challenge the brightest
- The understanding of complex physical concepts is built in sequence from basic experimental observations to in-depth mathematical calculations
- The learning progress is monitored by regular whole year assessment in all year groups within the department
- In a typical Physics lesson teachers will:
    - use modelling
    - use clear and impactful demonstrations or explanations
    - stress the accurate use of key terminology in explanations and definitions

Curriculum Impact:

- The percentage of the June 2025 cohort achieving a grade 9 was 40.3%, grades 8/9 was 62.5% and grades 7-9 was 81.9%. Whilst this was a drop from the average performance of CHB student through the lifetime of the current specification (65.3% grade 9's, 85.0% grades 8/9 and 95.4% grades 7-9) which was anticipated, it was very strong when compared to the cohorts performance across all their GCSE's, 26.4% grade 9's, 29.6% grades 8/9 and 69.0% grades 7-9. Physics had the highest number of grade 9's and the 2nd highest % grade 9.
- From 2018, the percentage of students achieving A* in externally examined A level Physics is 25.3% while the percentage achieving grades A*-B is 82.6%
- We have always had a large number of students who choose to study Physics at A Level in the sixth form and many of them continue to study Physics or Engineering at Oxbridge and Russell group universities. Such is the popularity of Physics that we are investigating the feasibility of expanding to a fifth A level group.

Department admin and resources

Staffing:

Staff	Roles	email
Mrs Azra Khan	Head of Physics, Radiation Protection Supervisor	a.khan@chb.kevibham.org
Dr Tomas Munoz-Britton	Assistant Head (Teaching and Learning), Teacher of Physics	t.munozbritton@chb.kevibham.org
Mr James Oggelsby	Teacher of Physics	j.oggelsby.chb.kevibham.org
Mr Joseph White (PT)	Teacher of Physics	j.white@chb.kevibham.org
Mrs Jagminder Hundal	Teacher of Physics, Chemistry, Biology & PSHE	j.hundal@chb.kevibham.org
Mr Matteo Bianconi	Trainee Teacher of Physics	m.bianconi@chb.kevibham.org
Mrs Wioletta Bartoszak	Head Technician, Deputy RPS	w.bartoszak@chb.kevibham.org
Mr Robert McQueen	Technician	r.mcqueen@chb.kevibham.org
Ms Patricia Crummay	Technician	p.crummay@chb.kevibham.org

Resources:

Laboratories and experimental resources:

Over the years the Physics department has built a large stock of equipment for all key stages' practical work. We are very proud that the department is able to offer our students a wide range of experiments in comparison to most state schools. In addition to the large number of experiments we offer, students generally can work by themselves or in pairs rather than sharing the apparatus between too many students.

The Physics department has three main labs, P1, P2 and P3 which are regularly used for practical lessons. Since we deliver a large quantity of practical lessons to our Key Stage 3 students, P1 and P2 are equipped with frequently used class-set apparatus for kinematics, dynamics, thermal and electricity practical's. This arrangement enables teachers to be able to get most of the key apparatus directly from the labs.

For KS4 and KS5 practical lessons, teachers and students may use Room 3 and Room 4 with all equipment delivered to the room by our technicians.

Textbooks:

The department has always produced booklets tailored to our cohort for KS3 and KS4.

In KS4 we also offer students *CGP Grade 9-1 Revision Guide* for further assistance.

In KS5 we offer *CGP A-Level Year 1 and Year 2 Physics – The Complete Course for AQA* as well as the *CGP AQA Revision Guide*.

Teaching Resources:

In the departmental team OneDrive, we share a set of very rich teaching resources which are always evolving as each member of the department contributes new resources or update the existing ones.

The department has also spent a great effort to create our own assessment materials, similar to the textbooks, we feel some of the worksheets widely available on the internet do not always suit the ability of our students. The assessment material we write is often more targeted to focus on our own curriculum intent, and most importantly, this offers an opportunity make some challenging questions for the most able students.

CPD:

Members of the department are always encouraged to attend external CPD in need of delivering certain topics or practical activities. In departmental meetings, feedback from external CPD is shared within the department. However, CPD activities are not only limited to focus on Physics, members of the department have also attended CPD to support UCAS applications, supervising EPQs, sports coaching, NPQs and other areas.

New Staff Information

The department seeks to implement the whole school policy for the induction of new members of staff.

The department will provide support and assistance through:

- information about the departmental resources, SoW, KS4 and KS5 specifications
- training on delivering experiment that the new members of the staff are not familiar with
- regular meetings with teachers who teach the same year group
- CPD within the department as well as externally
- opportunities to take responsibility for activities within the department
- support to take wider roles within the school community

Curriculum maps: KS3, 4 and 5

	Theory Development	Curriculum Rationale
Year 7	• basic application of mass/volume/density equation • basic application of distance/time/speed equation • basic understanding of weight and mass	We aim to provide a wide range of practical work for our Year 7 students so that our young pupils have the opportunity to enjoy a variety of different types of scientific investigations. We feel it is more important for the Year 7 students to focus on developing their investigational skills than too much emphasis on the in-depth theory learning at this stage. Although we do not reveal all the theoretical detail behind each experiment, it is very important for students to understand how we conduct each investigation and how to draw a valid conclusion based on the experimental results. Since our students are exposed to various practical work, most of our students become quite competent in using basic equipment in labs. A lot of the experiment are revisited in Y9, Y10 and Y11, with more focus on the theory side.

	Theory Development	Curriculum Rationale
Year 8	• law of reflection • plane mirror image formation through light ray diagrams • refraction of light through glass blocks • basic wave properties of light • basics of coloured light • basic structure of circuits • basics series circuits • curved mirrors and lenses through light ray diagrams • focal lengths and powers of converging lenses • basic eye structure and eye sight correction • basic magnetic field around bar magnets • basic magnetic field around direct current • basic static electricity	Our Year 8 curriculum is still heavily focused on experiment and students usually have one experiment per week. We start to gradually build some understanding on the concepts in parallel with the practical work. • We use basic reflection and refraction of light to open the world of waves but the more in-depth theory is revealed in Y10. Students learn to draw a lot of light ray diagrams which are not too abstract but also provide a great opportunity to transfer their Maths skills into Physics. The curriculum also offers some challenges for our most able students, such as calculating refractive index from critical angles. •The electricity topic also offers a wide range of experiment and students get to learn how to use equipment such as ammeters, voltmetres, rehostats, and thermistors appropriately. Energy and energy transfers are also built into the electricity topic. We introduce the basic electricity and circuit calculations in Y8 and move to the much complicated series and parallel circuits in Y10. •The electromagnetic topic mainly focuses on the observations of magnetic field using plotting compasses. Students learn to draw magnetic field lines of simple bar magnets and direct current. The theory behind and t he more complicated motor and generator effect are discussed in detail in Y11.

	Theory Development	Curriculum Rationale
Year 9	• distance-time and speed-time graphs • vector and scalar • motion equations • Newton's 1st, 2nd and 3rd laws • balanced and unbalanced forces • terminal velocity • friction and resistive forces • weight and mass • different types of forces • free body force diagrams • adding and resolving forces • momentum and conservation of momentum • collisions and car safeties • work done and energy transfers • Hooke's law and elastic difformations • GPE and KE • energy, power and efficiency • moments and centre of mass • liquid pressure and hydraulic system • solar system and space physics (research and project)	The Y9 curriculum is designed to bridge the transition between KS3 and KS4. The topics focuses on forces, motions and energy. In KS4 and KS5 Physics, forces motions and energy are the absolute fundamental building block for studying other topics. •The distance-time experiment in Y7 is revisited in Y9 with much in-depth explanation and discussions. This is the starting point where pupils start to build their more extensive understanding of graphs. The learning process also offers many opportunities to practise their maths skills. •The relationships between forces, motions and energy transfers serve as the foundation and core of physics studies throughout all key stages. We build this foundation from the most basic free body force diagrams and link the motion states to the forces exerted. In the exploration of different types of motion scenarios, pupils gradually develop their logical thinking and analytical skills. We also address the importance of using appropriate academic terms and highlight the common misconceptions such as the constant missuse of weight and mass, speed and velocity. •The study of liquid pressure, Hooke's Law, moments and momentum are all built on a good understanding of forces but these topics also explore wider side of physical studies and offers more explanations to a lot of real life experiences. •Energy and work done are embedded throughout the Y9 curriculum and the concept of energy conservation is designed to be well developed through the discussions of all physical scenarios such as car collisions and sky diving. •The solar system and space study provides a great opportunity for students to apply their knowledge of light and shadow and forces and motion into the topic. In addition, projects are set up for pupils to carry some of their own independent researches.

	Theory Development	Curriculum Rationale
Year 10 and Year 11	• basic wave features and properties • EM wave uses and hazards • how EM waves are produced • image formation of converging and diverging lenses • medical imaging using EM waves and ultra sound • atomic structure and isotopes • alpha beta gamma radiations and half lives • uses and hazard of radioactive isotopes • nuclear fission and fusion and nuclear power station • simple series and parallel circuits • alternating current, domestic electricity and national grid • I-V characteristics of ohmic conductors, filament lamp and diodes • electricity and energy calculations • static electricity • particle theory of matters • specific heat capacity and specific latent heat • gas pressure • magnetic field of bar magnets and direct current • motor effect and generator effect • Fleming's left hand role • how DC motor works • how AC generator works • how transformer works • satellite and circular motion • Doppler effect, red shift and blue shift • expansion of universe and origin of universe	The KS4 curriculum is vertically integrated with the KS3 curriculum but with new topics explored such as radioactivity. •In Y8 pupils have chances to physically observe light reflection, refraction and colour spectrum but there is little focus on the theory side. In Y10 the wave topic explores all different types of waves: from the entire electromagnetic spectrum, sound and ultra sound waves to Earthquakes. •The electricity curriculum in KS4 is also built on the Y8 study. Pupils have chances to do more circuit building practical work as well as develop deeper understandings of more complex series and parallel circuits. Domestic electricity and alternating current are also explored in this topic which offers many opportunities and challenges for pupils who consider to take Physics at A Level. •The atomic structure and radioactivity topic opens up the world of subatomic particles which are explored with a lot more detail in A Level. •The particle and matter topic brings some of the Y7 experiment back with more explanations. The study of gas pressure is another example to show how forces and motions are integrated in almost every topic. •The space physics is another extension of what pupils have explored in Y9. •The study of motor and generator is placed at the very last because the understanding of electromagnetic induction is built on top of basic magnetism, DC electricity, AC electricity and forces and moments. This topic truly challenges pupils' understanding of physics in all perspectives.

Last year we swapped the order of the Electricity and Particle Model of Matter Y10 topics. This was done to allow both topics to be covered at a pace appropriate for the changing cohort without compromising on the level of depth and breadth that is expected at CHB.

This will continue in 2025-26, especially as it has the added benefit of ensuring that the waves, atomic and particle model topics are completed before the End of Year 10 exams which have been moved to the end of April this academic year.

Year 12 Physics:

- Waves
    - Progressive and standing waves
    - Diffraction and interferences
- DC electricity
    - Mixed circuit calculations
    - EMF and internal resistance
    - Resistivity and super conductivity
    - I-V characteristics
    - Energy and power
- Mechanics
    - Uniform accelerations
    - Newton's laws
    - Energy and work done
    - Moments
    - Momentum and conservation of momentum
    - Circular motion
    - SHM and damping
- Particle physics and quantum phenomena
    - Classification of particles
    - Spectra of light
    - Wave particle duality
    - Matter and antimatter
    - Photoelectric effect

Year 13 Physics:

- Thermal physics
    - SHC and SLH
    - Gas laws
- Fields and their consequences
    - Gravitational field
    - Electric field and capacitance
    - Magnetic field and particle accelerators
    - EM inductions
    - Transformers and AC circuits
- Nuclear Physics
    - Alpha beta and gamma radiations
    - Nuclear decay and half life
    - Stable and unstable nucleus
    - Binding energy
    - Nuclear powers
- Option:
    - Astrophysics option

Assessment and marking

Each individual members of the department have their own mark book to monitor pupil progress. The marking policy is in line with the whole school assessment policy. The department aims to provide pupils with regular feedback through a combination of formative and summative assessment.

The Physics department also has a whole school tracking sheet to monitor all pupils' progress roughly four times per year. In each year group, pupils take the same assessments, and the results are used to identify students who may need immediate intervention as well as the very gifted and talented students who would benefit further challenge. The frequency of whole-cohort assessment is also intended to reduce teachers' marking load yet provide more reliable information on pupils' progress.

Homework

We will endeavour to comply with the school's policies on homework but with the additional interpretations below:

Y7 – a 20 minute activity roughly every 2 lessons. This will broadly alternate between an activity from their workbook or uploaded to their team or through Educake.

Y8 – a 20 to 30 minute activity roughly weekly. This will be either a written activity or an online activity through their team or Educake

Y9 – a 20 to 45 minute written or online activity weekly. A mix of written questions and using online platforms such as Educake and Isaac

Y10 and Y11 – a 30 to 45 minute written or online activity every 2 lessons. A mix of written questions and using online platforms such as Educake and Isaac

Y12 and Y13 – our expectation is that students will put in at least 5 hours of work per week. This will be supported with a variety of directed homework (1.5 to 2 hours per week) using a mix of written questions and online activities (e.g. Isaac, MCQ forms)

Closing the gap and SEND pupils

All pupil premium and SEND pupils are highlighted in teachers' mark book as well as the seating plans. All lesson plans are adapted to suit the SEND pupils' need. The Physics department uses the regular homework and classwork assessments as well as the whole-cohort assessments to identify pupils who need short term or medium term interventions.

Interventions:

- Appropriate self-study resources are signposted to the students by their teachers.
- Teachers may ask pupils back at lunchtime or breaktime for incomplete work or poor quality work.
- Teachers may email parents for repeated late or missing homework and poor quality homework or classwork.

- If students show little improvement on the quality of work after multiple inventions by the classroom teacher, Head of Department will out in place an appropriate intervention.
- All Year 7 and 8 lessons will have at least one Y12 Physics ambassador supporting the pupils.
- Lower school pupils who require additional support with classwork or homework can get help from the Y12 Physics ambassadors during lunchtimes on Tuesday, supervised by JKH.
- Lunchtime and after school revision sessions may be offered for exam group students who struggle to achieve their targeted grades.
- We also fully support any whole school intervention strategies.

Gifted and Talented

The department keeps a register of pupils considered gifted at Physics which is reviewed annually. These pupils are identified in staff and departmental mark books and their progress is monitored through the departmental examination results and departmental SEF.

Activities set out in the departmental SoW are designed to provide these students which appropriate stretch and challenge. The department offers additional extracurricular activities outside of lessons to provide additional breadth and depth. Information about these can be found in the departmental super curricular booklet and SEF.

Equality, Diversity and Inclusion

Our School is both creative and diverse where all are welcome, equal and included. We believe that Equality, Diversity and Inclusion, (EDI) is fundamental to a supportive, progressive and successful Department. The Physics Department provides an open and inclusive workplace and study culture where everyone is treated with dignity and respect. We are responsible for promoting best practice in everything we do and every member of our community should feel free to grow and progress without barriers.

British Values and SMSC education

British values are defined as including:

“democracy, the rule of law, individual liberty and mutual respect and tolerance for those with different faiths and beliefs”

Tolerance and respect characterise effective learning as set out in the Equality Act and where those with protected characteristics receive fair treatment so that all are treated equally. Individual colleges and providers will capture these expectations in their Mission and Values statements and also in codes of conduct for students. In implementing these standards teachers, tutors and lecturers will be exemplifying and promoting British Values.

Many learning opportunities in Physics will be framed by complying with Health and Safety legislation. This will include the role of risk assessments in defining and addressing risks. Opportunities will arise to discuss British law in this context.

There are a diverse range of topical scientific issues at GCSE level that with allow students to explore the nature of scientific evidence and the interplay between scientific communities, the media, politicians and policy makers. Students will find it necessary to distinguish between opinion based on

valid, repeatable and reproducible evidence and opinion based on non-scientific ideas (for example prejudices, or hearsay).

Health and Safety

General

Staff in the Physics department will follow the code of practice laid down in the school's Health and Safety Policy.

Staff will not embark on an activity without assessing the possible risk to health and safety. If there is any doubt, the member of staff should consult the Head of Physics. If the Head of Physics considers the activity unsafe then it will not take place.

Pupils should be instructed in safe practice. It is important that the pupils do not become afraid of the substances and equipment that they use, but become aware of the possible dangers if they do not use them safely. Staff should be vigilant in the laboratories for instances of unsafe working or carelessness. If necessary, pupils should be prevented from doing practical work. When a pupil deliberately indulges in dangerous practice, they should be referred to the Head of Physics.

No pupil may enter a laboratory or preparation area without a member of staff being present.

Chemicals

A safety assessment should be made before using or making any substance which may be hazardous. Pupils should be made aware of the hazard and told to inform the teacher immediately if spillages etc. occur. Safety assessments can be made by referring to CLEAPSS.

A spillage kit is available in all prep rooms. This will clear up spillages of acids, alkalis and organic liquids.

The laboratories are all fitted with automatic gas cut-off switches. If a leak is serious the whole building should be evacuated as for a fire drill. The gas provider and fire brigade should be called after informing the school office. If there is a serious emission of toxic gas the laboratory should be evacuated and if necessary, the whole affected area.

Radioactive sources

Azra Khan is the current Radiation Protection Supervisor (RPS) with Mrs Wioletta Bartoszak as the Deputy RPS. The RPS will ensure compliance with all CLEAPSS guidance (L93) regarding the use, storage and disposal of radioactive materials.

Before a lesson

Staff should carry out a safety assessment for all lessons consulting the CLEAPSS Hazcards where necessary and order their requirements from the technicians in plenty of time.

Substances and equipment which are not hazardous to health (i.e. no hazard indicating toxic, harmful, corrosive or irritant and no occupational exposure limit assigned by the Health and Safety Executive) require no action other than their use as directed by the manufacturer. Substances which are hazardous to health, but used in very small quantities and in such ways that the risk to heath is assessed as insignificant, require no further action other than to use as directed by the manufacturer. Substances which are hazardous to health and the risk to health could be significant should be used in accordance with the instructions given in the CLEAPSS Hazcards. The risk should be communicated to the pupils before they are used.

The technicians make every effort to supply materials and equipment in a safe manner. It is the teachers who has prime responsibility for safety in the laboratory and they should be alert to any deficiencies in equipment and take appropriate action.

Staff should know the location of:

- fire extinguishers and fire blankets in each laboratory
- gas cut off
- electricity cut off
- nearest telephone

All staff should be familiar with emergency exits, escape routes and those who are qualified to help if first aid is required.

During a lesson

Pupils should enter the laboratory in good order and discipline will be maintained at all times.

Pupil's bags should be stored in the laboratory so that they present no danger. Jackets and bags should not be left on benches.

Pupils will wear safety glasses when:

- heating substances
- using hazardous materials
- a danger is involved in the view of the teacher