Physics Year 11 Combined Science

Curriculum Intent

Physics is the study of energy and matter and their interactions. The GCSE Physics course provides an interesting and challenging experience to link key physical ideas and understand how they relate to each other.
The course aims for all students to: ·

- develop essential knowledge, understanding and application of different areas of the subject and how they relate to each other
- understand how society makes decisions about scientific issues and how Physics contributes to the success of the economy and society
- develop competence and confidence in a variety of practical, mathematical and problem solving skills
- develop and demonstrate a deep appreciation of the skills, knowledge and understanding of scientific methods
- promote students' interest in and enthusiasm for the subject, including an interest in further study and careers associated with the subject

Autumn Term | Particle Model and Atomic Structure

Students will learn:-

- Density
- Changes of state
- Internal energy
- Temperature changes and specific heat capacity
- Specific latent heat
- Particle model and pressure
- The structure of an atom
- Mass number, atomic number and isotopes
- Development of the model of the atom
- Radioactive decay and nuclear radiation
- Nuclear equations
- Half life
- Radioactive contamination

What does excellence look like?

- Explain the differences in density between the different states of matter in terms of the arrangement of atoms or molecules
- Able to use and accurately read the scales on Vernier callipers and micrometers
- Explain how and when heating will either change state of raise temperature
- Manipulate the equation for specific heat capacity to calculate mass and temperature changes
- Extract information from a power time graph to calculate the energy required to change state
- Explain why atoms have no overall electrical charge
- Relate differences between isotopes to differences in conventional representations of their identities, charges and masses
- Apply knowledge to the uses of radiation and evaluate the best sources of radiation to use in a given situation
- Calculate the net decline, expressed as a ratio, in a radioactive emission after a given number of half-lives
- Describe the factors that could affect the background radiation in a given place
- Explain why the hazards associated with radioactive material differ according to the half-life involved

Knowledge, understanding & Skills

- Recall and apply the equation linking density, mass, and volumeDraw simple diagrams to model the difference between solids, liquids and gases
- Use appropriate apparatus to make and record the measurements needed to determine the densities of regular and irregular solid objects and liquids
- Describe how, when substances change state (melt, freeze, boil, evaporate, condense or sublimate), mass is conserved
- Use the equation for specific heat capacity to calculate energy changes
- Use the equation for specific latent heat to calculate the energy required to change state
- Interpret cooling and heating graphs to measure energy transfers
- Describe the structure of an atom and the arrangement of protons, neutrons and electrons within it
- Use mass number and atomic number to determine the number of neutrons in different isotopes
- The electron arrangements may change with the absorption of electromagnetic radiation or by the emission of electromagnetic radiation
- Describe why evidence from the Rutherford scattering experiment lead to a change in the model of the atom
- Describe the difference between the Plum Pudding model and the nuclear model of an atom
- Describe the properties of alpha particles, beta particles and gamma rays is limited to their penetration through materials, their range in air and ionising power
- Use the names and symbols of common nuclei and particles to write balanced equations that show single alpha (α) and beta (β) decay
- Explain the concept of half-life and how it is related to the random nature of radioactive decay
- Determine the half-life of a radioactive isotope from given information
- Students should be able to compare the hazards associated with contamination and irradiation and suggest appropriate precautions

How will we assess impact?

Peer and self-assessment

Previous lesson recap quiz

Land mark tasks

End of topic test

How is homework used to enhance learning?

AQA website https://www.aqa.org.uk/subjects/science

BBC bitesize https://www.bbc.co.uk/bitesize/examspecs/zsc9rdm

Grade gorilla https://gradegorilla.com/

Isaac Physics https://isaacphysics.org/

AES student science website

https://sites.google.com/view/angloscience

Suggested homework tasks

- Learn definitions of key terms.
- Group and independent research projects
- Past examination questions practice

Practical activity preparation, simulations and follow-up

Spring Term | Electromagnetism

Students will learn:-

- Poles of a magnet
- Magnetic fields
- The Motor Effect
- Fleming's Left Hand Rule
- Electric motors

What does excellence look like?

- Explain how the behaviour of a magnetic compass is related to evidence that the core of the Earth must be magnetic
- Explain how a solenoid arrangement can increase the magnetic effect of the current
- Manipulate and apply the equation for magnetic force

Knowledge, Understanding & Skills

- Describe the attraction and repulsion between unlike and like poles for permanent magnets
- Describe the difference between permanent and induced magnets.
- Describe how to plot the magnetic field pattern of a magnet using a compass
- Draw the magnetic field pattern of a bar magnet showing how strength and direction change from one point to another
- describe how the magnetic effect of a current can be demonstrated
- Draw the magnetic field pattern for a straight wire carrying a current and for a solenoid
- Show that Fleming's left-hand rule represents the relative orientation of the force, the current in the conductor and the magnetic field.
- Recall the factors that affect the size of the force on the conductor.

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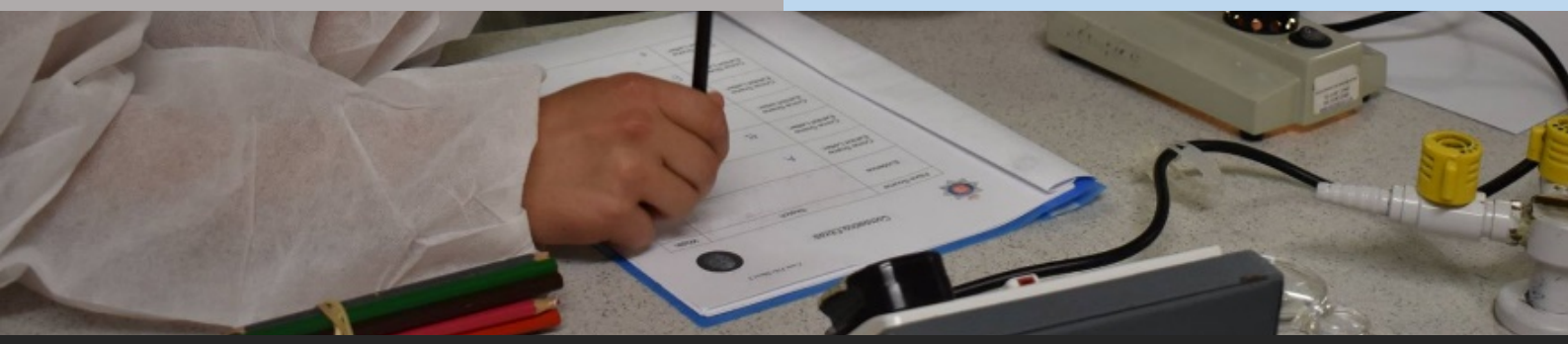

International Opportunities

Within the curriculum

The GCSE Physics curriculum is designed to deepen understanding and appreciation of how the International scientific society collaborates and makes decisions about world scientific issues.

Students are encouraged to research each theme beyond lessons, exploring topical international scientific examples. Classwork and homework is designed to ensure that they can draw upon a worldwide knowledge of skills, techniques and theoretical understanding required for their examinations and the potential further study of Physics at an International level at global universities.