Physics Year 10 Triple 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/Spring Term | Triple Forces & Electricity

Students will learn:-

- Change in momentum
- Moments, levers and gears
- Pressure and pressure differences in fluids
- Atmospheric pressure
- Current
- Potential Difference
- Resistance
- Electrical Charge
- Current-voltage characteristics
- Series and Parallel Circuits
- Energy transfers and power
- The National Grid
- Static Electricity

What does excellence look like?

- Calculate force using change of momentum
- Use turning moments to solve force problems
- Explain why, in a liquid, pressure at a point increases with the height of the column of liquid above that point and with the density of the liquid
- Explain why atmospheric pressure varies with height above a surface
- Students should be able to draw and interpret circuit diagrams
- Explain the design and use of a circuit to measure the resistance of a component
- Explain qualitatively why adding resistors in series increases the total resistance whilst adding resistors in parallel decreases the total resistance
- Explain how the power transfer in any circuit device is related to the potential difference across it and the current through it, and to the energy changes over time
- Explain why the National Grid system is an efficient way to transfer energy
- Explain how the transfer of electrons between objects can explain the phenomena of static electricity
- Explain how the concept of an electric field helps to explain the non-contact force between charged objects as well as other electrostatic phenomena such as sparking

Knowledge, understanding & Skills

- Describe reducing impact force using change of momentum
- Describe examples of car safety
- Describe examples in which forces cause rotation
- Calculate the size of a force, or its distance from a pivot, acting on an object that is balanced
- Describe how a simple lever and a simple gear system can both be used to transmit the rotational effects of forces
- Calculate the differences in pressure at different depths in a liquid.
- Describe the factors which influence floating and sinking
- Describe a simple model of the Earth's atmosphere and of atmospheric pressure

- Standard circuit symbols
- The equation linking current, charge and time
- The equation linking voltage, current and resistance
- The applications of thermistors in circuits eg a thermostat
- The application of LDRs in circuits eg switching lights on when it gets dark
- Use circuit diagrams to construct appropriate circuits to investigate the I–V characteristics of a variety of circuit elements, including a filament lamp, a diode and a resistor at constant temperature
- Use circuit diagrams to construct and check series and parallel circuits that include a variety of common circuit components
- Describe the difference between series and parallel circuits
- Calculate the currents, potential differences and resistances in dc series circuits
- Solve problems for circuits which include resistors in series using the concept of equivalent resistance
- Describe how different domestic appliances transfer energy from batteries or ac mains to the kinetic
- energy of electric motors or the energy of heating devices
- Describe the use of transformers in the National Grid
- Describe the production of static electricity, and sparking, by rubbing surfaces
- Describe evidence that charged objects exert forces of attraction or repulsion on one another when not in contact
- Draw the electric field pattern for an isolated charged sphere
- Explain the concept of an electric field

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/Summer | Waves

Students will learn:-

- Transverse and longitudinal waves
- Wave properties
- Reflection of waves
- Sound waves
- Waves for detection and exploration
- Electromagnetic waves
- Lenses
- Visible light
- Blackbody radiation

What does excellence look like?

- Recall and apply the wave speed equation
- Manipulate the wave speed equation in complex problems involving converting units
- Recall and apply the relationship between frequency and time period
- Explain why such processes only work over a limited frequency range and the relevance of this to human hearing
- Explain in qualitative terms, how the differences in velocity, absorption and reflection between different types of wave in solids and liquids can be used both for detection and exploration of structures which are hidden from direct observation
- Explain how different substances may absorb, transmit, refract or reflect electromagnetic waves in ways that vary with wavelength
- Use wave front diagrams to explain refraction in terms of the change of speed that happens when a wave travels from one medium to a different medium
- Explain why each type of electromagnetic wave is suitable for particular practical applications
- Accurately construct ray diagrams for each type of lens and its function
- Describe fully an image formed from a lens
- Explain how the colour of an object is related to the differential
- absorption, transmission and reflection of different
- wavelengths of light by the object
- Explain the colour of opaque objects
- Explain how the temperature of the Earth depends on many factors including: the rates of absorption and mission of radiation, reflection of radiation into space

Knowledge, Understanding & Skills

- Describe the difference between longitudinal and transverse waves
- Students should be able to describe evidence that, for both ripples on a water surface and sound waves in air, it is the wave and not the water or air itself that travels
- Describe wave motion in terms of their amplitude, wavelength, frequency and period
- Identify amplitude and wavelength from given diagrams
- Describe a method to measure the speed of sound waves in air
- Describe a method to measure the speed of ripples on a water surface
- Identify the suitability of apparatus to measure the frequency, wavelength and speed of waves in a ripple tank and waves in a solid and take appropriate measurements
- Construct ray diagrams to illustrate the reflection of a wave at a surface
- Students should be able to describe the effects of reflection, transmission and absorption of waves at material interfaces
- Investigate the reflection of light by different types of surface and the refraction of light by different substances
- Describe, with examples, processes which convert wave disturbances between sound waves and vibrations in solids
- Demonstrate awareness that the study of seismic waves provided new evidence that led to discoveries about parts of the Earth which are not directly observable
- Recall the regions of the electromagnetic spectrum.
- Give examples that illustrate the transfer of energy by electromagnetic waves
- Construct ray diagrams to illustrate the refraction of a wave at the boundary between two different media
- Investigate how the amount of infrared radiation absorbed or radiated by a surface depends on the nature of that surface.
- Construct ray diagrams to illustrate the similarities and differences between convex and concave lenses
- Apply the equation for magnification to problems involving lenses
- Investigate the magnification produced by a range of convex lenses.
- Recall the regions of the visible spectrum and describe the effect of colour filters on white light
- Explain that all bodies (objects) emit radiation and that the intensity and wavelength distribution of any emission depends on the temperature of the body

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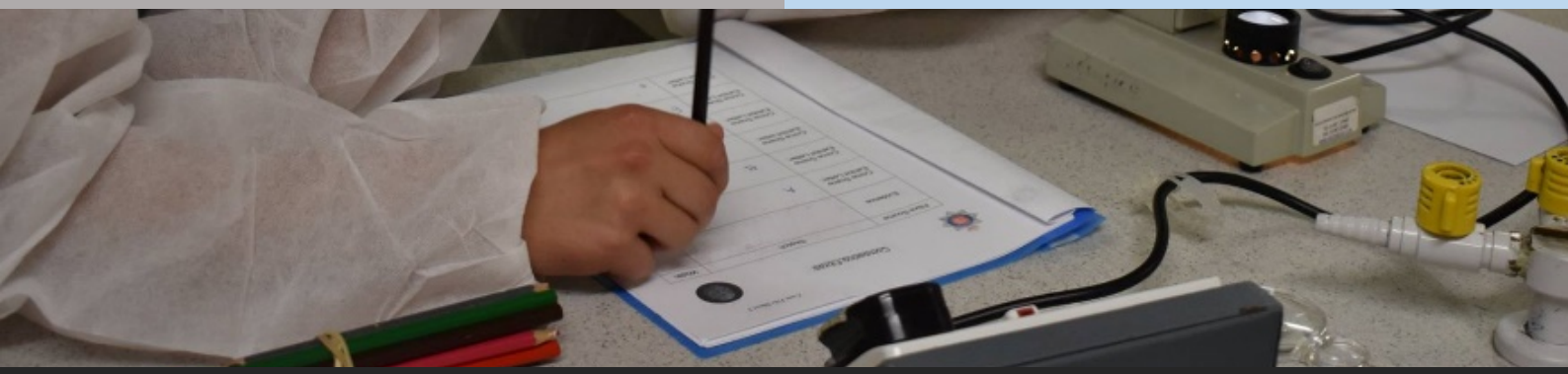

International Opportunities

Visits Programmes

A wide range of exchange visits are available for year 9 students.

Many visits include Science Museum and significant landmarks

Cross curriculum visit to Iceland

For up to date information, see visits programme.

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.