Physics GCSE

BVGS Curriculum Summary

Physics involves the study of matter, its motion and behaviour through space and time, and studies the related entities of Force and Energy. **The main goal of Physics is to understand how the universe behaves.** The study of physical concepts over time has led, sometimes inadvertently, to the development of many technologies that have transformed modern-day society.

Through studying GCSE Physics, students will learn to understand how the complex and diverse phenomena of the natural world can be described in terms of a small number of key ideas which are of universal application and which can be illustrated in the topics further below.

These core ideas include:

- the use of **models**, as in the particle model of matter of the wave models of light and sound
- the concept of **cause and effect** in explaining such links as those between force and acceleration, or between changed in atomic nuclei and radioactive emissions
- the phenomena of **"action at a distance"** and the related concept of the field as they key to analysing electrical, magnetic and gravitational effects
- that **differences,** for example between pressures or temperatures of electrical potentials, are the drier of change
- that **proportionality**, for example between weight and mass of an object or between force and extension in a spring, is an important aspect of many models in science
- that physical laws and models of nature are expressed in **mathematical form**

The topics covered in GCSE Physics include:

Energy

- Energy transfers and changes in a system
- Conservation and dissipation of energy
- Stores of energy (e.g. kinetic, gravitational potential, elastic potential…)
- Power, work done and efficiency
- Energy transfers by heating (including conduction, insulation, radiation and specific heat capacity)
- National and global energy sources for generating electricity

Electricity

- Static electricity and charge
- Current, potential difference, resistance and energy transfer
- Series and parallel circuits
- Alternating current, domestic uses and safety

Particle Model of Matter (including Atomic Structure)

- Changes of state, density and the particle model
- Internal energy, energy transfer and particle motion as the cause of pressure
- Radioactivity and isotopes
- Absorption/emission of ionising radiation (including properties of alpha, beta and gamma radiation)
- Nuclear fusion and fission

Forces and Motion

- Forces and their interactions
- Moments, levers and gears

- Vectors and scalars
- Forces, accelerations and Newton's laws of motion
- Speed, velocity, and motion graphs
- Applications of force and motion in vehicle safety
- Pressure (in solids, liquids and gases) and variation of pressure with depth in fluids

Waves (including Light and the Electromagnetic Spectrum)
- Waves in gases, liquids and solids
- Wave properties (wavelength, amplitude, frequency, wave speed and time period)
- Longitudinal and transverse waves
- Waves at material interfaces (e.g. reflection and refraction)
- Earthquake waves
- Sound waves in applications (e.g. ultrasound foetal scans)
- Frequency range of the electromagnetic spectrum
- Colour and frequency; differences in transmission, absorption and diffuse reflection
- Blackbody Radiation

Magnetism
- Permanent & induced magnetism, magnetic forces & fields
- Magnetic fields & current (including electromagnets & the motor/generator effects)
- Induced potential, transformers, the national grid, microphones and speakers

Space
- Lifecycle of stars and the formation of the solar system
- Satellite motion
- Red shift as the evidence of the "big bang" and universal expansion

Students will study these through:
- Planning, conducting and analysing experimental investigations (including 10 assessed required experiments as a minimum)
- Class and group discussion
- Research
- Imagining – e.g. "thought experiments"
- Computer simulations and animations
- Written practice of questions and problems - e.g. use of exam questions and textbooks
- Formative and summative assessments

The format of the final exams are:

Paper 1	Paper 2
Topics: **Energy, Electricity, and Particle model of matter**	**Topics:** **Forces and Motion, Waves, Magnetism, and Space** Questions in Paper 2 may draw on an understanding of energy changes and transfers due to heating, mechanical and electrical work and the concept of energy conservation from Energy and Electricity.
How it's assessed: Written exam – 1h 45m 100 marks 50% of GCSE	How it's assessed: Written exam – 1h 45m 100 marks 50% of GCSE