



CHELTENHAM
LADIES'
COLLEGE

SIXTH FORM ENTRY IN SEPTEMBER 2027

PHYSICS

It should be noted that our Physics entrance paper aims to be more a test of potential than a test of memory and so students should attempt as many questions (or parts thereof) as they can, even if the topic in the questions does not look familiar. There will be questions that require both logical thinking and deductive reasoning based upon the scientific method. Students will be expected to apply these skills within contexts that may be unfamiliar to them.

We will be looking for:

- ▶ sound basic physics ideas and skills
- ▶ a reasonable range of knowledge – but it is appreciated that all candidates are unlikely to have covered all the topics
- ▶ the ability to apply existing knowledge to unknown situations
- ▶ the ability to use and interpret data provided
- ▶ the ability to plot and interpret graphs
- ▶ recognition of trends and patterns
- ▶ reasoning ability
- ▶ numerical skill
- ▶ some understanding of the way scientific investigations are carried out
- ▶ how to ensure precise and accurate measurements
- ▶ how to ensure the evidence obtained is valid and reliable

Physics topics and concepts that we expect SFC entrance candidates to have met and be able to demonstrate their knowledge and understanding in by the time they take the entrance papers for either A- level or IB Diploma are:

Fundamental Concepts – Knowledge and Understanding Assumed:

Forces and Motion

- ▶ velocity and acceleration
- ▶ distance-time and velocity-time graphs
- ▶ free-body force diagrams

- ▶ forces, acceleration and Newton's laws of motion
- ▶ resultant force
- ▶ weight and mass
- ▶ moments and centre of mass
- ▶ momentum – collisions and explosions
- ▶ stretching and Hooke's Law

Energy

- ▶ principle of conservation of energy
- ▶ Sankey diagrams
- ▶ methods of thermal energy transfer
- ▶ efficiency
- ▶ work and power
- ▶ kinetic energy
- ▶ energy resources

Electricity and Static Electricity

- ▶ common circuit symbols
- ▶ series and parallel circuits
- ▶ current, voltage and resistance
- ▶ electrical energy and power
- ▶ conductors and insulators
- ▶ how objects gain a static charge
- ▶ effects of static charge

Magnetism and Electromagnetism

- ▶ magnets can cause attraction or repulsion
- ▶ simple magnetic field patterns around permanent magnets
- ▶ electromagnets – what they are, how to vary strength of them, simple applications
- ▶ *motor effect and electromagnetic induction will not be tested*

Waves and Optics

- ▶ wave properties: frequency, amplitude, wavelength, time period and the wave equation
- ▶ longitudinal and transverse waves
- ▶ reflection
- ▶ refraction
- ▶ lenses
- ▶ sound and ultrasound
- ▶ electromagnetic spectrum – including uses and dangers

Solids, Liquids and Gases

- ▶ states of matter and changes of state
- ▶ density
- ▶ pressure (*not gas pressure*)

Astrophysics

- ▶ solar system
- ▶ days, years and seasons
- ▶ earth's place in the universe

Questions may be set and linked to the following concepts, but no prior knowledge will be assumed:

Forces and Motion

- ▶ terminal velocity
- ▶ circular motion

Waves and Optics

- ▶ refractive index, critical angle and total internal reflection
- ▶ Doppler effect (*not the Doppler effect equation*)

Solids, Liquids and Gases

- ▶ specific heat capacity

Radioactivity

- ▶ atomic structure
- ▶
- ▶ spontaneous nature of decay
- ▶ nature of alpha, beta and gamma radiation
- ▶ *fission and fusion will not be tested*