AQA A-level Physics Year 12 and Year 13- course overview

A-level AQA Physics develops students' understanding of fundamental principles that explain how the universe behaves, from subatomic particles to large-scale motion. Students study mechanics, including forces, energy, momentum, and circular motion, alongside materials and their properties. They explore electricity and circuits, waves and optics, and the nature of particles and radiation in quantum physics. The course also covers fields such as gravitational, electric and magnetic fields, and extends into nuclear physics and thermal physics. Throughout, students apply mathematical skills and practical techniques to model real-world phenomena and solve complex problems.

Year 12 Physics content

Advent 1

AQA Physics develops students' understanding of the fundamental nature of matter and energy. In particles and radiation, students explore the structure of the atom, fundamental particles, and how particle interactions explain the behaviour of matter, including the role of antiparticles and conservation laws. In waves, they study wave properties such as diffraction, interference, and refraction, as well as the formation and behaviour of stationary waves and their applications in areas such as musical instruments and resonance.

Key areas of study:

- Particles & radiation
- Waves: basics, properties, stationary waves

Advent 2

AQA Physics develops students' understanding of the behaviour of light and matter at both classical and quantum scales. In quantum phenomena, students study evidence for the quantum nature of energy, including the photoelectric effect and wave–particle duality, leading to the concept of photons and quantised energy levels. In refraction, diffraction, and interference, they explore how waves change speed and direction between media, and how they spread and overlap to produce interference patterns, demonstrating the wave nature of light.

Key areas of study:

- Quantum phenomena
- Refraction, diffraction and interference

Lent 1

AQA Physics develops students' understanding of how electricity behaves in circuits and how motion can be analysed quantitatively. In electric basics, IV characteristics and resistivity, students explore current, voltage and resistance, including how different components behave and how resistivity depends on material and physical conditions. In measurements and kinematics, they develop practical and mathematical skills to record and analyse data, and to describe motion using equations of motion, graphs, and key concepts such as displacement, velocity, and acceleration.

Key areas of study:

- Electric basics, IV characteristics & resistivity
- Measurements & kinematics

Lent 2

AQA Physics develops students' understanding of how energy is transferred in electrical and mechanical systems. In emf and internal resistance, students study how sources of electrical energy supply voltage, and how internal resistance affects the output of cells and circuits. In dynamics, forces and energy, they explore Newton's laws of motion, the relationship between force, mass and acceleration, and how energy is transferred and conserved in different physical systems.

Key areas of study:

- EMF and internal resistance
- Dynamics, forces and energy

Trinity

AQA Physics develops students' understanding of how matter behaves at both microscopic and macroscopic scales. In thermal physics, students study internal energy, temperature, heat transfer, and the kinetic theory of gases to explain how particles behave in different states of matter. In materials, they explore how solids deform under forces, including stress, strain, and Young's modulus, and how the properties of materials determine their usefulness in engineering and design.

Key areas of study:

- Thermal physics
- Materials

Year 13 Physics content

Advent 1

Year 13 AQA Physics develops students' understanding of how energy, motion, and radiation behave in different physical systems. In thermal physics, students study internal energy, temperature, and the kinetic theory of gases to explain the behaviour of matter. In simple harmonic motion and circular motion, they explore oscillations such as springs and pendulums, as well as the forces involved in uniform circular motion. They also learn about radioactive decay, half-life, and the inverse square law, applying these ideas to nuclear physics and radiation intensity.

Key areas of study:

- Thermal physics
- Simple harmonic motion and circular motion
- Properties, half-life and inverse square law

Advent 2

Year 13 AQA Physics develops students' understanding of nuclear processes and how forces act over distance. In decay constant, fusion and fission, students study radioactive decay, half-life, and the mathematical nature of decay, as well as how nuclear fusion and fission release energy in stars and nuclear reactors. In gravitational fields, they explore how masses attract each other, including concepts such as gravitational field strength, potential, and orbital motion, and how these ideas explain planetary and satellite motion.

Key areas of study:

- Decay constant, fusion & fission
- Gravitational fields

Lent 1

Year 13 AQA Physics develops students' understanding of how we observe the universe and how electric forces act over distance. In telescopes, students study how optical and other types of telescopes collect and focus electromagnetic radiation to observe distant objects in space, including concepts such as resolution and magnification. In electric fields, they explore how charged particles interact through electric forces, including field strength, potential difference, and the motion of charges within uniform and radial fields.

Key areas of study

- Telescopes
- Electric fields

Lent 2

Year 13 AQA Physics develops students' understanding of the universe and the forces that act within it. In spectral classes and the Big Bang, students study how the spectra of stars are used to determine temperature, composition and motion, and how evidence such as red shift supports the Big Bang theory of the origin and expansion of the universe. In magnetic fields, they explore how moving charges and current-carrying conductors experience forces in magnetic fields, including field patterns, flux density, and applications such as motors and electromagnetic induction.

Key areas of study:

- Spectral classes and big bang
- Magnetic fields

Trinity

Year 13 AQA Physics develops students' practical and investigative skills alongside their theoretical understanding. In practical skills, students learn how to plan experiments, use a wide range of apparatus, record and analyse data, and apply mathematical techniques to evaluate results. They also develop their ability to assess uncertainty, improve experimental methods, and draw valid scientific conclusions from practical investigations.

Key areas of study:

- Practical skills