

Year 11 Science (AQA GCSE Combined Science: Trilogy 8464)

- Year 11 completes the GCSE programme. Students cover the remaining Paper 2 content for biology, chemistry, and physics during the Autumn and Spring terms.
- All new content is completed by the end of the Spring term. The Summer term is dedicated to structured revision and preparation for the final GCSE examinations.
- The three sciences continue to be taught in tandem, with each subject covering the content listed below.
- Knowledge is assessed through end-of-topic tests, regular retrieval practice, mock examinations, and homework tasks set regularly.
- Required practicals are embedded within the relevant topics and are indicated below.

Autumn Term

Biology	Chemistry	Physics
Homeostasis and Response	Rate and Extent of Chemical Change · Organic Chemistry · Chemical Analysis	Forces
<p>Homeostasis: the regulation of internal conditions to maintain optimum conditions for enzyme action and cell function; includes control of body temperature, blood glucose concentration, and water and nitrogen levels · The nervous system: receptors detect stimuli; coordination centres (brain, spinal cord) process information; effectors (muscles and glands) carry out responses · Sensory, motor, and relay neurones; synapses and the transmission of nerve impulses · Reflex arcs: the pathway of a reflex action; importance of reflexes for survival · Required practical: plan and carry out an investigation into the effect of a factor on human reaction time · The brain: cerebral cortex, cerebellum, and medulla; the difficulty of investigating brain function · The eye: structure and function; accommodation; common defects (myopia and hyperopia) and their correction · The endocrine system: glands and hormones; the</p>	<p>Recap of rates of reaction from Year 9: factors affecting rate, collision theory, and activation energy · Reversible reactions and dynamic equilibrium · Reversible reactions: represented by the \rightleftharpoons symbol · Energy changes in reversible reactions: if a forward reaction is exothermic, the reverse is endothermic (and vice versa), by the same amount · (HT only) Dynamic equilibrium: in a closed system at equilibrium, the rate of the forward reaction equals the rate of the reverse reaction · (HT only) The effect of changing conditions (temperature, pressure, concentration) on the position of equilibrium · Organic Chemistry · Crude oil: a finite resource; a mixture of hydrocarbons · Fractional distillation: separation based on boiling points; the fractions and their uses · Hydrocarbons: alkanes as a homologous series; general formula C_nH_{2n+2} · Properties of hydrocarbons: trends in boiling point, viscosity, and</p>	<p>Recap of forces from Year 9: scalar and vector quantities, contact and non-contact forces, weight ($W = mg$), resultant forces, and work done ($W = Fd$) · Speed and velocity · Distance and displacement; speed and velocity · Calculating speed: $s = vt$ · Distance–time graphs: interpreting gradient as speed · Acceleration · Acceleration as the rate of change of velocity: $a = \Delta v \div t$ · Velocity–time graphs: interpreting gradient as acceleration and area under the graph as distance · Uniform acceleration equation: $v^2 = u^2 + 2as$ (HT only) · Required practical: investigate the effect of varying the force on the acceleration of an object of constant mass, and the effect of varying the mass on the acceleration produced by a constant force · Newton's laws of motion · First law: an object remains stationary or at constant velocity unless acted on by a resultant force · Second law: resultant force = mass \times acceleration ($F =$</p>

Biology	Chemistry	Physics
<p>pituitary gland as the 'master gland' · Control of blood glucose concentration: the roles of insulin and glucagon; Type 1 and Type 2 diabetes and their treatments · Hormones in human reproduction: puberty, the menstrual cycle (FSH, LH, oestrogen, progesterone) · Contraception: hormonal and non-hormonal methods; evaluating their use · (HT only) The use of hormones to treat infertility (IVF); negative feedback systems</p>	<p>flammability with chain length · Combustion of hydrocarbons: complete and incomplete; products and associated problems · Cracking: breaking down long-chain hydrocarbons into shorter, more useful molecules; thermal and catalytic cracking · Chemical Analysis · Pure substances and formulations · Chromatography: identifying substances from chromatograms; calculating Rf values · Required practical: investigate how paper chromatography can be used to separate and tell the difference between coloured substances · Identification of common gases: hydrogen, oxygen, carbon dioxide, and chlorine</p>	<p>ma); inertial mass · Third law: for every action there is an equal and opposite reaction · Stopping distances · Thinking distance and braking distance; factors affecting each · Braking force and the work done by friction; the dangers of large decelerations · (HT only) Estimating braking distances at different speeds · (HT only) Momentum · Momentum = mass × velocity ($p = mv$); conservation of momentum in collisions</p>

Key Scientific Skills	Key Scientific Skills	Key Scientific Skills
<p>Investigating reaction time and evaluating experimental method · Explaining reflex arcs using diagrams · Interpreting data on blood glucose regulation · Evaluating the use of hormonal and non-hormonal contraception · Explaining negative feedback loops</p>	<p>Interpreting fractional distillation in terms of intermolecular forces · Balancing equations for combustion reactions · Calculating Rf values from chromatograms · Identifying common gases using standard tests · Predicting the effect of changing conditions on equilibrium (HT)</p>	<p>Drawing and interpreting distance–time and velocity–time graphs · Calculating speed, acceleration, and momentum · Applying Newton's laws to explain motion in context · Investigating force and acceleration experimentally · Estimating stopping distances using data</p>

Assessing Understanding	Assessing Understanding	Assessing Understanding
<p>End-of-topic tests · Regular retrieval practice in lessons · Homework tasks set regularly</p>	<p>End-of-topic tests · Regular retrieval practice in lessons · Homework tasks set regularly</p>	<p>End-of-topic tests · Regular retrieval practice in lessons · Homework tasks set regularly · Mock examinations</p>

Spring Term

Biology	Chemistry	Physics
Inheritance, Variation, and Evolution · Ecology	Chemistry of the Atmosphere · Using Resources	Waves · Magnetism and Electromagnetism
<p>Sexual and asexual reproduction: advantages and disadvantages of each · Meiosis: cell division that produces gametes with half the number of chromosomes; genetic variation through meiosis · DNA and the genome: the structure of DNA (double helix, base pairs); the human genome project and its significance · (HT only) Protein synthesis: the role of DNA in coding for proteins; transcription and translation · Genetic inheritance: dominant and recessive alleles; homozygous and heterozygous genotypes; constructing and interpreting Punnett squares · Inherited disorders: polydactyly (dominant) and cystic fibrosis (recessive); interpreting family trees · Sex determination: XX and XY chromosomes · Variation: caused by genes, environment, or a combination of both · Evolution by natural selection: Darwin's theory; the role of variation, competition, and survival · Selective breeding: choosing organisms with desired characteristics to breed together · Genetic engineering: the transfer of genes from one organism to another; potential benefits and risks · Classification: Linnaeus's system; the three-domain system (Archaea, Bacteria, Eukaryota); evolutionary trees</p>	<p>The Earth's early atmosphere: theories about its composition (volcanic activity); how the atmosphere changed over time · How oxygen levels increased: photosynthesis by early organisms · How carbon dioxide levels decreased: dissolution in the oceans, formation of sedimentary rocks and fossil fuels, photosynthesis · The composition of the atmosphere today: approximately 80% nitrogen, 20% oxygen, small proportions of other gases · Greenhouse gases and climate change · Greenhouse gases: carbon dioxide, methane, and water vapour; the greenhouse effect · Human activities contributing to increased greenhouse gas levels · Global climate change: potential effects and why it is difficult to model · Carbon footprint: ways to reduce it · Atmospheric pollutants · Pollutants from combustion of fossil fuels: carbon monoxide, sulfur dioxide, nitrogen oxides, particulates · Their effects on health and the environment (acid rain, global dimming) · Using Resources · Using the Earth's resources: natural products supplemented or replaced by agriculture and synthetic products · Finite vs renewable resources · Sustainable development: meeting present needs without compromising future generations · Potable water: the distinction between potable and pure water; treatment of fresh water and desalination · Required practical: analyse and purify water samples from different sources · Waste water treatment:</p>	<p>Wave properties · Transverse and longitudinal waves; examples of each · Describing waves: amplitude, wavelength, frequency, and period · Wave speed equation: $v = f\lambda$ · Required practical: make observations to identify the suitability of apparatus to measure the frequency, wavelength, and speed of waves in a ripple tank and waves in a solid · Reflection and refraction at boundaries · Sound waves: longitudinal waves that require a medium; hearing range and ultrasound · Uses of ultrasound (medical imaging, industrial applications) · Electromagnetic waves · The electromagnetic spectrum: radio, microwave, infrared, visible, ultraviolet, X-ray, gamma ray · Properties of EM waves: transverse, travel at the speed of light in a vacuum · Uses and hazards of each type of EM wave · Required practical: investigate how the amount of infrared radiation absorbed or radiated by a surface depends on the nature of that surface</p>

Biology	Chemistry	Physics
	stages of sewage treatment (screening, sedimentation, aerobic digestion) · Reducing the use of resources: reduce, reuse, recycle · Life cycle assessments: evaluating the environmental impact of a product from cradle to grave	
Ecology		Magnetism and Electromagnetism
<p>Communities and ecosystems: populations, habitats, niches, interdependence, competition · Abiotic factors: light intensity, temperature, moisture, soil pH, wind speed, carbon dioxide levels · Biotic factors: food availability, new predators, new pathogens, competition · Adaptations: structural, behavioural, and functional; extremophiles · Food chains and trophic levels; predator–prey relationships · Required practical: measure the population size of a common species in a habitat using sampling techniques (quadrats and transects) · How materials are cycled: the water cycle and the carbon cycle · Biodiversity: the variety of species in an ecosystem; importance of maintaining biodiversity · Human impacts on biodiversity: waste management, land use, deforestation, and peat bog destruction · Global warming: effects on ecosystems and species distribution · Maintaining biodiversity: breeding programmes, seed banks, habitat regeneration, reintroduction of hedgerows</p>		<p>Poles of a magnet: attraction and repulsion; magnetic fields around bar magnets · The Earth's magnetic field · Magnetic effect of a current: the magnetic field around a straight wire and a solenoid · Electromagnets: how they work and factors affecting their strength · Fleming's left-hand rule: the motor effect; force on a current-carrying conductor in a magnetic field · Calculating force: $F = BIl$ · Electric motors: how they work using the motor effect</p>

Key Scientific Skills	Key Scientific Skills	Key Scientific Skills
Constructing and interpreting Punnett squares and family trees · Explaining natural selection using evidence · Evaluating the benefits and risks of genetic engineering · Using quadrats and transects to sample populations · Interpreting data on biodiversity and environmental change · Describing the water and carbon cycles	Explaining changes in atmospheric composition using evidence · Evaluating methods to reduce carbon footprint · Interpreting life cycle assessments · Analysing and purifying water samples · Evaluating the environmental impact of resource use	Using the wave equation $v = f\lambda$ · Investigating wave properties experimentally · Comparing uses and dangers of EM radiation · Drawing and interpreting magnetic field diagrams · Applying Fleming's left-hand rule · Calculating force on a conductor using $F = BIl$

Assessing Understanding	Assessing Understanding	Assessing Understanding
End-of-topic tests · Regular retrieval practice in lessons · Homework tasks set regularly · Mock examinations	End-of-topic tests · Regular retrieval practice in lessons · Homework tasks set regularly · Mock examinations	End-of-topic tests · Regular retrieval practice in lessons · Homework tasks set regularly · Mock examinations

Summer Term

Biology	Chemistry	Physics
Revision and Examination Preparation	Revision and Examination Preparation	Revision and Examination Preparation
Structured revision covering all Paper 1 and Paper 2 content · Retrieval practice across all topics · Past paper practice with mark scheme feedback · Targeted intervention on areas of weakness · Walking-talking mock examinations	Structured revision covering all Paper 1 and Paper 2 content · Retrieval practice across all topics · Past paper practice with mark scheme feedback · Targeted intervention on areas of weakness · Walking-talking mock examinations	Structured revision covering all Paper 1 and Paper 2 content · Retrieval practice across all topics · Past paper practice with mark scheme feedback · Targeted intervention on areas of weakness · Walking-talking mock examinations

Assessment Overview

AQA GCSE Combined Science: Trilogy (8464) is a linear qualification — all six examinations are sat at the end of Year 11.

Paper	Topics Assessed	Exam Details
Biology Paper 1	Cell Biology · Organisation · Infection and Response · Bioenergetics	1 hour 15 minutes · 70 marks · 16.7% of GCSE
Biology Paper 2	Homeostasis and Response · Inheritance, Variation and Evolution · Ecology	1 hour 15 minutes · 70 marks · 16.7% of GCSE
Chemistry Paper 1	Atomic Structure and the Periodic Table · Bonding, Structure, and Properties of Matter · Quantitative Chemistry · Chemical Changes · Energy Changes	1 hour 15 minutes · 70 marks · 16.7% of GCSE
Chemistry Paper 2	Rate and Extent of Chemical Change · Organic Chemistry · Chemical Analysis · Chemistry of the Atmosphere · Using Resources	1 hour 15 minutes · 70 marks · 16.7% of GCSE
Physics Paper 1	Energy · Electricity · Particle Model of Matter · Atomic Structure	1 hour 15 minutes · 70 marks · 16.7% of GCSE
Physics Paper 2	Forces · Waves · Magnetism and Electromagnetism	1 hour 15 minutes · 70 marks · 16.7% of GCSE

All papers are available at Foundation and Higher Tier. Question types include multiple choice, structured, closed short answer, and open response.

Required Practicals Covered in Year 11

Subject	Description
Biology	Investigate the effect of a factor on human reaction time
Biology	Measure the population size of a common species in a habitat using sampling techniques (quadrats and transects)
Chemistry	Investigate how paper chromatography can be used to separate and identify substances; calculate Rf values
Chemistry	Analyse and purify water samples from different sources
Physics	Investigate the effect of varying the force on the acceleration of an object of constant mass
Physics	Make observations to identify apparatus for measuring the frequency, wavelength, and speed of waves
Physics	Investigate how the amount of infrared radiation absorbed or radiated by a surface depends on its nature

Note: Required practicals from Year 9 (microscopy, osmosis, investigating concentration and rates of reaction) also contribute to the full set of required practicals across the course.

Resources: A revision guide is available for purchase on ParentPay. Study Packs (Digital Flashcards) are made available to students.