

Year 10 Science (AQA GCSE Combined Science: Trilogy 8464)

- Year 10 is the first full year of the GCSE programme. Students follow the AQA Combined Science: Trilogy specification, studying biology, chemistry, and physics in tandem throughout the year.
- The three sciences are taught sequentially within each term, with each subject covering the content listed below.
- By the end of Year 10, students will have completed the content assessed on Chemistry Paper 1 and made substantial progress through Biology Paper 1 and Physics Paper 1.
- Knowledge is assessed through end-of-topic tests, regular retrieval practice, and regularly assigned homework.
- Required practicals are embedded within the relevant topics and are indicated below.

Autumn Term

Biology	Chemistry	Physics
Organisation	Atomic Structure and the Periodic Table	Particle Model of Matter
Principles of organisation: cells → tissues → organs → organ systems → organisms · Enzymes: biological catalysts with specific active sites; the lock and key model · Effect of temperature and pH on enzyme activity · Digestive enzymes: amylase (carbohydrases), proteases, and lipases; sites of production and action · Role of bile in digestion: neutralisation and emulsification · Required practical 3: use qualitative reagents to test for carbohydrates, lipids, and proteins · Required practical 4: investigate the effect of pH on the rate of reaction of amylase enzyme · The heart: structure, double circulatory system, coronary arteries, pacemakers · Blood vessels: structure and function of arteries, veins, and capillaries · Blood: plasma, red blood cells, white blood cells, and platelets; functions and adaptations · Coronary heart	Review of atomic structure, electronic configuration, and the periodic table from Year 9 · Bonding, Structure, and the Properties of Matter · Ionic bonding: transfer of electrons between metals and non-metals; formation of ions · Ionic compounds: giant ionic lattices; properties including high melting points, conduction when molten or dissolved · Covalent bonding: sharing of electrons between non-metal atoms · Small molecules: weak intermolecular forces, low melting and boiling points, poor conductors · Polymers: large molecules made of repeating units; properties related to intermolecular forces · Giant covalent structures: diamond, graphite, silicon dioxide; properties linked to structure · Graphene and fullerenes: structure and uses · Metallic bonding: lattice of positive ions surrounded by delocalised electrons · Properties of metals and	Internal energy: energy stored within the kinetic and potential energy of particles · Changes of state in terms of particle kinetic energy and bonds between particles · Specific heat capacity: energy needed to raise the temperature of 1 kg by 1 °C · Calculating energy change: $\Delta E = mc\Delta\theta$ · Required practical 14: investigate the specific heat capacity of materials · Specific latent heat: energy needed to change the state of 1 kg without changing temperature · Calculating energy for a change of state: $E = mL$ · (HT only) Particle model and pressure: explaining pressure in terms of particle motion and collisions

Biology	Chemistry	Physics
disease: causes, stents, statins, valve replacements, transplants, and artificial hearts	alloys · Start of Quantitative Chemistry · Conservation of mass and balanced equations · Relative formula mass (Mr) calculations	

Key Scientific Skills	Key Scientific Skills	Key Scientific Skills
Using the lock and key model to explain enzyme specificity · Carrying out food tests using qualitative reagents · Investigating enzyme activity at different pH values · Interpreting data on heart disease risk factors · Evaluating treatments for cardiovascular disease	Drawing dot-and-cross diagrams for ionic and covalent bonding · Representing giant ionic lattices, small molecules, and giant covalent structures · Explaining properties of materials in terms of bonding and structure · Calculating relative formula mass	Calculating energy changes using $\Delta E = mc\Delta\theta$ and $E = mL$ · Investigating specific heat capacity experimentally · Drawing and interpreting heating and cooling curves · Explaining changes of state using the particle model

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

Spring Term

Biology	Chemistry	Physics
Organisation (continued)	Quantitative Chemistry (continued)	Atomic Structure
Health and disease: the relationship between health and disease; interactions between communicable and non-communicable diseases · Lifestyle risk factors for non-communicable diseases: diet, smoking, alcohol, exercise · Effect of lifestyle on cardiovascular disease, Type 2 diabetes, liver disease, lung disease, and	Moles and amounts of substance (HT only) · Mass changes when a reactant or product is a gas · Chemical measurements: uncertainty in measurements · Chemical Changes (first half) · Reactivity series of metals · Extraction of metals: relation to reactivity · Oxidation and reduction (redox)	The structure of the atom: protons, neutrons, electrons; their charges and masses · The size of the nucleus compared to the atom · Development of the atomic model: Dalton, Thomson (plum pudding), Rutherford (alpha scattering), Bohr (electron orbits), Chadwick (neutron) · Radioactive decay: emission of

Biology	Chemistry	Physics
<p>cancer · Cancer: benign and malignant tumours; genetic and lifestyle risk factors · Plant tissues, organs, and organ systems · Plant tissues: epidermal, palisade mesophyll, spongy mesophyll, xylem, phloem, meristem · The leaf as a plant organ · Plant organ system for transport: roots, stem, and leaves · Root hair cells: adapted for water uptake (osmosis) and mineral ion uptake (active transport) · Xylem: transports water and mineral ions; structure adapted for function · Phloem: transports dissolved sugars (translocation); structure adapted for function · Transpiration: the process and factors affecting rate (temperature, humidity, air movement, light intensity) · Stomata and guard cells: role in gas exchange and water loss</p>	<p>in terms of oxygen transfer · Oxidation and reduction in terms of electron transfer · Reactions of acids with metals: metal + acid → salt + hydrogen · Reactions of acids with metal oxides and metal hydroxides: neutralisation reactions · Naming salts from the acid and metal/base used · Required practical 8: preparation of a pure, dry sample of a soluble salt from an insoluble oxide or carbonate</p>	<p>radiation from unstable nuclei · Types of nuclear radiation: alpha (α), beta (β), and gamma (γ); their properties, penetrating power, and ionising ability · Nuclear equations for alpha and beta decay · Half-life: the time taken for the count rate or number of radioactive nuclei to halve · Determining half-life from graphs and data · Radioactive contamination vs irradiation: the distinction and associated hazards · Peer review of evidence relating to risks of radiation</p>

Bioenergetics (start)		
<p>Photosynthesis as an endothermic reaction: carbon dioxide + water → glucose + oxygen · Rate of photosynthesis: effects of light intensity, temperature, and carbon dioxide concentration · Limiting factors on the rate of photosynthesis · Inverse square law and light intensity (HT only) · Uses of glucose: respiration, cellulose, amino acids, lipids, starch · Required practical 6: investigate the effect of light intensity on the rate of photosynthesis</p>		

Key Scientific Skills	Key Scientific Skills	Key Scientific Skills
Interpreting data on risk factors for non-communicable diseases · Translating disease incidence data between graphical and numerical forms · Explaining transpiration in terms of environmental factors · Investigating the rate of photosynthesis · Interpreting graphs of limiting factors	Calculating masses of reactants and products · Preparing pure, dry samples of soluble salts · Writing ionic equations for neutralisation · Explaining oxidation and reduction using electron transfer	Writing nuclear equations for alpha and beta decay · Interpreting half-life graphs and data · Evaluating the hazards of radioactive contamination and irradiation · Explaining the development of the atomic model using experimental evidence

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

Summer Term

Biology	Chemistry	Physics
Bioenergetics (continued)	Chemical Changes (continued)	Electricity
Aerobic respiration: glucose + oxygen → carbon dioxide + water; an exothermic reaction · Anaerobic respiration in animals: glucose → lactic acid · Anaerobic respiration in plants and yeast (fermentation): glucose → ethanol + carbon dioxide · Comparison of aerobic and anaerobic respiration · The response to exercise: increased heart and breathing rate; oxygen debt · Metabolism: the sum of all reactions in a cell or organism; examples including synthesis of proteins, lipids, and glycogen, breakdown of excess amino acids (urea), and respiration	Reactions of acids with metal carbonates: metal carbonate + acid → salt + water + carbon dioxide · The pH scale and indicators; strong and weak acids (HT only) · Electrolysis: the process of using electricity to decompose ionic compounds · Electrolysis of molten ionic compounds · Electrolysis of aqueous solutions: predicting products at each electrode · Required practical 9: investigate electrolysis of aqueous solutions using inert electrodes · Energy Changes · Exothermic and endothermic reactions: energy transfer to and from the surroundings · Reaction profiles: showing the relative energies of	Circuit symbols and constructing circuits · Series and parallel circuits: rules for current and potential difference · Current in series circuits: the same at all points · Current in parallel circuits: the sum of currents through branches equals the total · Potential difference in series circuits: shared between components · Potential difference in parallel circuits: the same across each branch · Resistance: $V = IR$; the effect of length and type of wire · Required practical 15: investigate the relationship between potential difference and current (I–V characteristics) for a filament lamp, diode, and fixed resistor · Ohmic

Biology	Chemistry	Physics
	reactants and products, and activation energy · The energy change of reactions in terms of bond energies: energy in = bonds broken; energy out = bonds made (HT only) · Required practical 10: investigate the variables that affect temperature changes in reacting solutions	conductors, filament lamps, and diodes: interpreting I–V graphs · Thermistors: resistance decreases as temperature increases · LDRs: resistance decreases as light intensity increases · Applications of thermistors and LDRs in circuits · Energy transfers in circuits: $P = VI$ and $P = I^2R$ · Energy transferred: $E = Pt$ and $E = QV$ · The National Grid: step-up and step-down transformers; efficient transmission at high voltage

Key Scientific Skills	Key Scientific Skills	Key Scientific Skills
Comparing aerobic and anaerobic respiration · Explaining the body's response to exercise · Describing metabolism as the sum of all biochemical reactions · Linking respiration to active transport and other energy-requiring processes	Drawing and interpreting reaction profiles · Calculating energy changes from bond energy data · Predicting products of electrolysis · Investigating temperature changes in reacting solutions	Constructing and interpreting series and parallel circuits · Investigating I–V characteristics experimentally · Interpreting I–V graphs for different components · Calculating power and energy transferred in circuits · Explaining the role of transformers in the National Grid

Assessing Understanding	Assessing Understanding	Assessing Understanding
End-of-topic tests · Regular retrieval practice in lessons · Homework tasks set regularly	End-of-topic tests · Regular retrieval practice in lessons · Homework tasks set regularly	End-of-topic tests · Regular retrieval practice in lessons · Homework tasks set regularly · End-of-year examination covering all Year 10 topics

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 10

Subject	RP	Description
Biology	3	Use qualitative reagents to test for carbohydrates, lipids, and proteins
Biology	4	Investigate the effect of pH on the rate of reaction of amylase enzyme
Biology	6	Investigate the effect of light intensity on the rate of photosynthesis
Chemistry	8	Preparation of a pure, dry sample of a soluble salt
Chemistry	9	Investigate electrolysis of aqueous solutions using inert electrodes
Chemistry	10	Investigate variables that affect temperature changes in reacting solutions
Physics	14	Investigate the specific heat capacity of materials
Physics	15	Investigate the relationship between potential difference and current (I–V characteristics)

End-of-year assessment: Students sit end-of-year examinations covering the majority of Year 10 topics across biology, chemistry, and physics.

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