

AQA Combined Science- Foundation

Biology - Paper 1

Spec Ref	Learning Outcome (I can...)	Required Practical	Revision Links
4.1.1 Cell Structure	• Describe eukaryotic and prokaryotic cells. • Explain differences between animal, plant and bacterial cells. • Explain the functions of cell structures (nucleus, cytoplasm, membrane, mitochondria, ribosomes, cell wall, vacuole, chloroplasts, plasmids).	—	Revision Link 1 Revision Link 2
4.1.2 Cell Division	• Describe chromosomes and DNA structure. • Explain the stages of the cell cycle and mitosis. • Define stem cells and discuss their uses/ethics.	—	Revision Link 1 Revision Link 2
4.1.3 Transport in Cells	• Describe diffusion and factors that affect it. • Explain osmosis in terms of water movement. • Explain active transport with examples.	Req. Practical 3: Osmosis in plant tissue	Revision Link 1 Revision Link 2
4.2.2 Organisation - Animal Tissues, Organs & Systems	• Describe the human digestive system and the functions of organs. • Explain the role of enzymes and factors affecting them. • Describe blood components and adaptations. • Describe the structure of the heart and blood circulation. • Explain the role of the lungs in gas exchange.	Req. Practical 4: Food tests (sugars, starch, proteins, lipids) Req. Practical 5: Effect of pH on enzyme activity	Revision Link 1 Revision Link 2
4.2.3 Plant Tissues & Organs	• Describe plant tissues (epidermal, palisade, spongy mesophyll, xylem, phloem). • Explain the role of stomata and guard cells. • Describe transport of water (xylem) and sugars (phloem).	Req. Practical 6: Investigate the effect of light intensity on the rate of transpiration (potometer).	Revision Link 1 Revision Link 2

Spec Ref	Learning Outcome (I can...)	Required Practical	Revision Links
4.3.1 Communicable Diseases	• Describe types of pathogens and examples of diseases. • Explain how bacteria and viruses make us ill. • Describe human defence mechanisms. • Explain vaccination and immunity. • Describe antibiotics and resistance. • Outline stages in drug development.	—	Revision Link 1 Revision Link 2
4.3.3 Plant Diseases & Defences	• Describe symptoms and identification of plant diseases. • Describe physical and chemical plant defences.	—	Revision Link 1 Revision Link 2
4.4.1 Photosynthesis	• State the word and symbol equations for photosynthesis. • Explain factors affecting the rate of photosynthesis. • Describe uses of glucose in plants.	Req. Practical 7: Investigate the effect of light intensity on photosynthesis (pondweed).	Revision Link 1 Revision Link 2
4.4.2 Respiration	• Write word equations for aerobic and anaerobic respiration. • Describe the differences between aerobic and anaerobic respiration. • Explain how organisms use energy from respiration. • Describe the response to exercise and oxygen debt.	—	Revision Link 1 Revision Link 2

Biology - Paper 2

Spec Ref	Learning Outcome (I can...)	Required Practical	Revision Links
4.5.1 Homeostasis	• Define homeostasis. • Explain why it is important. • Identify control systems (receptors, coordination centres, effectors).	—	Revision Link 1 Revision Link 2
4.5.2 The Human Nervous System	• Describe the structure & function of the nervous system. • Explain how information passes along neurones. • Describe reflex actions (reflex arc).	Req. Practical 8: Investigate human reaction time	Revision Link 1 Revision Link 2
4.5.3 Hormonal Control	• Define hormone and endocrine system. • Identify glands and hormones they produce. • Explain blood glucose control (insulin & glucagon). • Compare type 1 and type 2 diabetes. • Explain the role of adrenaline and thyroxine in negative feedback.	—	Revision Link 1 Revision Link 2
4.5.3.3 Hormones in Human Reproduction	• Describe the role of oestrogen, FSH, and LH in the menstrual cycle. • Explain fertility treatments, including IVF. • Evaluate social/ethical issues in IVF.	—	Revision Link 1 Revision Link 2
4.6.1 Reproduction	• Describe asexual vs sexual reproduction. • Explain meiosis and its importance. • Describe the structure of DNA and define the genome. • Define gene, allele, dominant, recessive, phenotype, genotype. • Use Punnett squares, family trees. • Describe inherited disorders (polydactyly, cystic fibrosis). • Discuss ethical issues of embryo screening.	—	Revision Link 1 Revision Link 2
4.6.2 Variation & Evolution	• Describe causes of variation. • Explain Darwin's theory of natural selection. • Explain extinction. • Describe selective breeding and its risks. • Describe genetic engineering and GM crops. • Discuss the advantages/disadvantages of GM organisms.	—	Revision Link 1 Revision Link 2

Spec Ref	Learning Outcome (I can...)	Required Practical	Revision Links
4.6.3 The Development of Understanding of Genetics	• Explain Mendel's work. • Describe developments leading to knowledge of DNA. • Discuss how scientific explanations change with new evidence.	—	Revision Link 1 Revision Link 2
4.7.1 Adaptations, Interdependence & Competition	• Describe levels of organisation in an ecosystem. • Describe interdependence and competition. • Identify biotic and abiotic factors. • Suggest factors that organisms compete for.	—	Revision Link 1 Revision Link 2
4.7.2 Organisation of an Ecosystem	• Interpret food chains & webs. • Identify producers, consumers, predators, and prey. • Describe carbon & water cycles.	Req. Practical 9: Investigate populations using quadrats/transects.	Revision Link 1 Revision Link 2
4.7.3 Biodiversity & the Effect of Human Interaction	• Define biodiversity. • Describe human impacts (deforestation, land use, pollution, global warming). • Explain how biodiversity can be maintained.	—	Revision Link 1 Revision Link 2

Chemistry - Paper 1

Spec Ref	Learning Outcome (I can...)	Required Practical	Revision Links
5.1.1 A simple model of the atom	• Describe the structure of the atom (protons, neutrons, electrons). • State charges and relative masses of subatomic particles. • Calculate number of protons, neutrons, and electrons from atomic/proton numbers. • Describe historical models of the atom (Dalton, Thomson, Rutherford, Bohr, Chadwick).	—	Revision Link 1 Revision Link 2
5.1.2 The Periodic Table	• Describe how the Periodic Table is arranged (atomic number). • Explain similarities in groups and periods. • Describe trends in Groups 1, 7 and 0. • Describe reactions of Group 1 and Group 7 elements. • Explain the development of the periodic table (Mendeleev).	—	Revision Link 1 Revision Link 2
5.2.1 Chemical Bonds, Ionic, Covalent & Metallic	• Describe ionic, covalent, and metallic bonding. • Draw dot and cross diagrams for simple molecules and ions. • Explain how ions form.	—	Revision Link 1 Revision Link 2
5.2.2 How structure and bonding are related to properties	• Explain properties of ionic compounds. • Explain properties of simple covalent molecules. • Describe properties of giant covalent structures. • Explain properties of polymers, metals, and alloys.	—	Revision Link 1 Revision Link 2
5.2.3 Carbon structures	• Describe and explain properties of diamond, graphite, graphene, and fullerenes.	—	Revision Link 1 Revision Link 2
5.3.1 Quantitative Chemistry	• State the law of conservation of mass. • Calculate relative formula mass (Mr). • Calculate moles from mass and vice versa. • Use balanced equations to calculate masses. • Calculate concentration in g/dm³.	—	Revision Link 1 Revision Link 2

Spec Ref	Learning Outcome (I can...)	Required Practical	Revision Links
5.4.1 Reactivity of Metals	• Describe oxidation and reduction in terms of oxygen. • Use the reactivity series. • Predict displacement reactions. • Explain the extraction of metals by reduction. • Explain displacement and ionic equations.	—	Revision Link 1 Revision Link 2
5.4.2 Reactions of Acids	• Name salts from acids. • Describe reactions of acids with metals, bases, alkalis, and carbonates. • Explain neutralization and the pH. scale.	Req. Practical 4: Preparation of a pure, dry sample of a soluble salt	Revision Link 1 Revision Link 2
5.4.3 Electrolysis	• Explain the process of electrolysis. • Describe electrolysis of molten compounds. • Describe electrolysis of aqueous solutions. • Predict products at electrodes.	Req. Practical 5: Electrolysis of aqueous solutions using inert electrodes	Revision Link 1 Revision Link 2
5.5.1 Energy Changes	• Describe exothermic and endothermic reactions. • Interpret energy profile diagrams. • State examples of each type. • Calculate energy changes (bond energies).	Req. Practical 6: Investigate temperature changes in reacting solutions	Revision Link 1 Revision Link 2

Chemistry - Paper 2

Spec Ref	Learning Outcome (I can...)	Required Practical	Revision Links
5.6.1 Rate of Reaction	• Define rate of reaction and calculate rate from data. • Describe collision theory and activation energy. • Explain the effect of concentration, temperature, surface area, and catalysts on rate.	Req. Practical 7: Investigate the effect of concentration on the rate of reaction (gas volume or colour change).	Revision Link 1 Revision Link 2
5.6.2 Reversible Reactions & Equilibria	• Identify reversible reactions. • Describe energy changes in reversible reactions. • Explain dynamic equilibrium and the effect of changing conditions (qualitative).	—	Revision Link 1 Revision Link 2
5.7.1 Organic Chemistry – Hydrocarbons	• Describe crude oil as a mixture of hydrocarbons. • Define hydrocarbon. • Recognise the first 4 alkanes and their formulae. • Describe fractional distillation of crude oil. • Explain cracking and uses of alkenes.	—	Revision Link 1 Revision Link 2
5.7.2 Structure & Formulae of Alkanes/Alkenes	• Draw and interpret displayed formulae. • Explain reactions of alkenes with oxygen, hydrogen, and halogens.	—	Revision Link 1 Revision Link 2
5.8.1 Chemical Analysis –Purity & Formulations	• Define pure substance and formulation. • Use melting/boiling point data to assess purity.	—	Revision Link 1 Revision Link 2
5.8.2 Chromatography	• Describe chromatography and how it separates mixtures. • Interpret chromatograms. • Calculate R_f values.	Req. Practical 8: Paper chromatography.	Revision Link 1 Revision Link 2

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5.8.3 Identification of Common Gases	• State and carry out tests for: H₂ (squeaky pop), O₂ (glowing splint relit), CO₂ (limewater), Cl₂ (bleaches litmus).	—	Revision Link 1 Revision Link 2
5.9.1 The Earth's Atmosphere	• Describe the composition of the current atmosphere. • Describe the early atmosphere and how it changed. • Explain how oxygen increased and CO₂ decreased.	—	Revision Link 1 Revision Link 2
5.9.3 Common Atmospheric Pollutants	• Identify pollutants from combustion of fuels (CO, SO₂, NO_x, particulates). • Explain their effects on health and the environment.	—	Revision Link 1 Revision Link 2
5.10.1 Using Earth's Resources & Potable Water	• Define renewable and non-renewable resources. • Define potable water. • Describe methods of producing potable water from fresh water, seawater, and wastewater.	Req. Practical 9: Investigate water purity (distillation and tests).	Revision Link 1 Revision Link 2
5.10.2 Life Cycle Assessment & Recycling	• Describe how LCA is used. • Explain the benefits/limitations of recycling.	—	Revision Link 1 Revision Link 2

Physics - Paper 1

Spec Ref	Learning Outcome (I can...)	Required Practical	Revision Links
6.1.1 Energy changes in a system	• Identify energy stores and describe transfers. • Calculate kinetic energy ($ek = \frac{1}{2}mv^2$). • Calculate gravitational potential energy ($ep = mgh$). • Calculate elastic potential energy ($ee = \frac{1}{2}ke^2$). • Calculate work done ($W = Fd$).	—	Revision Link 1 Revision Link 2
6.1.2 Conservation & dissipation of energy	• State the law of conservation of energy. • Describe useful and wasted energy. • Calculate efficiency. • Suggest ways to reduce unwanted energy transfers.	—	Revision Link 1 Revision Link 2
6.1.3 National & global energy resources	• Describe renewable and non-renewable resources. • Explain the environmental impacts of different energy sources. • Compare the advantages/disadvantages of resources.	—	Revision Link 1 Revision Link 2
6.2.1 Current, potential difference, resistance	• Use circuit symbols. • Define current ($i = q/t$). • Define potential difference ($v = e/q$). • Define resistance ($r = v/i$). • Interpret i-v graphs for resistor, filament lamp, diode. • Describe the use of LDRs and thermistors.	Req. Practical 10: Investigate resistance in circuits.	Revision Link 1 Revision Link 2
6.2.2 Series & parallel circuits	• Describe current and potential difference in series and parallel circuits. • Calculate total resistance in series.	—	Revision Link 1 Revision Link 2
6.2.3 Domestic uses & safety	• Describe UK mains supply (frequency, voltage). • Explain live, neutral, earth wires and their functions. • Explain power transfer in appliances ($P = IV$, $P = I^2R$). • Calculate energy transferred ($E = Pt$, $E = QV$).	—	Revision Link 1 Revision Link 2

Spec Ref	Learning Outcome (I can...)	Required Practical	Revision Links
6.3.1 Density of materials	• Recall equation for density ($\rho = m/V$). • Calculate the density of regular and irregular objects.	Req. Practical 11: Determine the density of solids and liquids.	Revision Link 1 Revision Link 2
6.3.2 Changes of state & internal energy	• Describe changes of state in terms of particles. • Define internal energy. • Explain latent heat (fusion, vaporisation). • Use $e = ml$.	Req. Practical 12: Investigate the change of state and specific latent heat.	Revision Link 1 Revision Link 2
6.3.3 Particle model & pressure	• Describe the relationship between pressure and volume of a gas at constant temperature. • Explain the effect of changing temperature on gas pressure.	—	Revision Link 1 Revision Link 2
6.4.1 Atoms & isotopes	• Describe atomic structure and isotopes. • Define activity and count rate.	—	Revision Link 1 Revision Link 2
6.4.2 Nuclear radiation	• Describe alpha, beta, gamma radiation (properties & penetration). • Write nuclear equations. • Define half-life. • Describe hazards of irradiation and contamination.	—	Revision Link 1 Revision Link 2
6.4.3 Uses of nuclear radiation	• Describe uses of radiation in medicine (tracers, radiotherapy). • Explain risks and precautions.	—	Revision Link 1 Revision Link 2

Physics - Paper 2

Spec Ref	Learning Outcome (I can...)	Required Practical	Revision Links
6.5.1 Forces & interactions	• Distinguish between scalar and vector quantities. • Represent forces with arrows. • Calculate weight ($w = mg$). • Draw force diagrams and calculate resultant force. • Describe effects of forces on objects.	—	Revision Link 1 Revision Link 2
6.5.2 Work done & energy transfer	• Calculate work done ($W = Fd$). • Calculate elastic potential energy. • Interpret force–extension graphs. • Explain Hooke's Law.	Req. Practical 13: Investigate the stretching of a spring.	Revision Link 1 Revision Link 2
6.5.3 Pressure in fluids	• Recall pressure = force $\div$ area. • Explain pressure in liquids. • Describe atmospheric pressure changes with height.	—	Revision Link 1 Revision Link 2
6.5.4 Describing motion	• Calculate speed and velocity. • Interpret distance–time and velocity–time graphs. • Calculate acceleration. • Explain terminal velocity.	Req. Practical 14: Investigate motion (e.g. light gates, trolley ramp).	Revision Link 1 Revision Link 2
6.5.5 Newton's laws of motion	• State and apply Newton's 1st, 2nd, 3rd laws. • Use $F = ma$. • Explain inertial mass. • Describe momentum conservation (qualitative).	—	Revision Link 1 Revision Link 2
6.5.6 Stopping distance	• Define stopping, thinking, and braking distance. • Identify factors affecting them. • Describe the dangers of large decelerations.	—	Revision Link 1 Revision Link 2

Spec Ref	Learning Outcome (I can...)	Required Practical	Revision Links
6.6.1 Transverse & longitudinal waves	• Describe characteristics of waves. • Calculate wave speed ($v = f\lambda$). • Measure frequency, wavelength, and amplitude.	Req. Practical 15: Investigate waves on a string or water surface.	Revision Link 1 Revision Link 2
6.6.2 Electromagnetic waves	• Recall the order of the EM spectrum. • Describe properties, uses and risks of EM waves. • Explain how atoms and nuclei emit EM waves.	—	Revision Link 1 Revision Link 2
6.6.3 Sound waves	• Describe how sound waves are produced. • Explain how sound travels through media. • Describe ultrasound and its uses (medical scanning, industry).	—	Revision Link 1 Revision Link 2
6.7.1 Permanent & induced magnetism	• Describe permanent vs induced magnets. • Describe attraction/repulsion of poles. • Plot magnetic fields with compasses.	—	Revision Link 1 Revision Link 2
6.7.2 The motor effect	• Describe the motor effect. • Calculate force on a conductor ($F = BIL$). • Explain how electric motors work.	—	Revision Link 1 Revision Link 2
6.7.3 Electromagnetic induction	• Explain how a potential difference is induced in a conductor. • Describe the generator effect. • Explain how microphones and loudspeakers work (qualitative).	—	Revision Link 1 Revision Link 2
6.7.4 The National Grid	• Describe how transformers work (qualitative). • Explain why step-up and step-down transformers are used. • Explain the efficiency of power transmission.	—	Revision Link 1 Revision Link 2