Combined Science Paper 2 HIGHER

Biology

These specification points will be the **major focus** of this paper.

Spec point	Concepts	CGP revision guide pages	Bitesize	YouTube
4.5.3 Hormonal Control in Humans	-definition of 'hormone' function of the tissues and organs of the endocrine system -identifying position of glands, and the hormones secreted from them -hormones involved in control of blood glucose concentration -Type 1 and Type 2 diabetes -explain how glucagon interacts with insulin in a negative feedback cycle to control blood glucose (sugar) levels in the body. -describe the roles of hormones in human reproduction, including the menstrual cycle -explain the interactions of FSH, oestrogen, LH and progesterone, in the control of the menstrual cycle -explain the use of hormones in modern reproductive technologies to treat infertility. -explain the roles of thyroxine and adrenaline in the body. Thyroxine levels are controlled by negative feedback	110 112-115 120	https://www.bbc.co.uk/bitesize/guides/zq4mk2p/revision/1	https://www.youtube.com/watch?v=c6olhi88KZs https://www.youtube.com/watch?v=77oyUdNZ054 GCSE Biology Hormones in human reproduction (AQA 9-1) – YouTube GCSE Science Revision Biology "The Menstrual Cycle" – YouTube GCSE Science Revision Biology "Hormones to Treat Infertility" – YouTube GCSE Science Revision Biology "Negative Feedback" – YouTube
4.7.2 Organisation of an ecosystem	-interpret food chains and webs -identify producers, consumers, predators and prey from food chains and webs -describe the carbon and water cycles	157-160	https://www.bbc.co.uk/bitesize/guides/zqskv9q/revision/1	https://www.youtube.com/watch?v=dRFQ8rZCK6Q https://www.youtube.com/watch?v=urzpnjwazV0
4.7.3 Biodiversity and the effect of human interaction on an ecosystem	-Define biodiversity -Describe ways in which pollution can occur, and the impacts of this pollution on biodiversity -Describe ways to manage this pollution -describe some of the biological consequences of global warming. -Describe the things that scientists have introduced to reduce the negative effects of humans on ecosystems and biodiversity.	163-166 169-170	Biodiversity and interdependance - Biodiversity and the effect of human interaction on ecosystems - AQA - GCSE Combined Science Revision - AQA Trilogy - BBC Bitesize	GCSE Science Revision Biology "Biodiversity" – YouTube GCSE Science Revision Biology "Maintaining Biodiversity" – YouTube GCSE Biology - How Human Waste Reduces Biodiversity - Explained #63 – YouTube GCSE Science Revision Biology "Global Warming" - YouTube
Required Practical 7: measure the population size of a common species in a habitat. Use sampling techniques to investigate the effect of a factor on the distribution of this species	-Using transects and quadrats are used by ecologists to determine the distribution and abundance of species in an ecosystem. -Understand the terms mean, mode and median -Calculate arithmetic means	157-158	https://www.bbc.co.uk/bitesize/guides/zqskv9q/revision/3	https://www.youtube.com/watch?v=2MW6nwf80XM https://www.youtube.com/watch?v=RhMOCxXcDrQ https://www.youtube.com/watch?v=yLHz2Ea10Mg&t=2s

These specification points will **not be assessed** on this paper.

Spec point	CGP Revision Guide Pages
4.5.2 The human nervous system	105
4.5.3.4 Contraception	117
4.6.1.1 Sexual and asexual reproduction **4.6.1.3** DNA and the genome	122-124
4.6.1.4 Genetic Inheritance **4.6.1.5** Inherited Disorders **4.6.1.6** Sex Determination **4.6.2** Variation and Evolution **4.6.3.** The development of understanding of genetics and evolution	126-150
4.7.1.4 Adaptations	155
4.7.3.3 Land Use **4.7.3.4** Deforestation	167

These areas **may still be assessed** in multiple choice questions/linked to a previous answer, so cannot be completely ignored in your revision.

Content	CGP Revision Guide Pages
Homeostasis	104
Meiosis	125
Classification	148
Competition and Abiotic/Biotic Factors	151-153

Chemistry

These specification points will be the **major focus** of this paper.

Spec point	Concepts	CGP revision guide pages	Bitesize	YouTube
5.6.1 Rate of Reaction	-Calculating the rate of a reaction -Calculate the gradient of a tangent to the curve on these graphs as a measure of rate of reaction at a specific time. -Describe collision theory -Define activation energy -Describe and explain the factors that increase the rate of reaction -Describe and explain the effect of catalysts on rate of reaction	253-260	https://www.bbc.co.uk/bitesize/guides/zpkp7p3/revision/1	https://www.youtube.com/watch?v=UkrBJ6-uGFA https://www.youtube.com/watch?v=GCR5xeduq2o https://www.youtube.com/watch?v=-4HXaUBbv04 https://www.youtube.com/watch?v=hel8fQjxcO8
Required Practical 11: investigate how concentration affects the rates of reaction by a method involving measuring the volume of a gas produced/change in colour	-identify independent, dependent and control variables -describe how to measure the dependent variable -analyse results and draw conclusions from graphed data -calculate rate of reaction from data	258-259	https://www.bbc.co.uk/bitesize/guides/zpkp7p3/revision/6	https://www.youtube.com/watch?v=N5p06i9ilmo https://www.youtube.com/watch?v=Gl6LVl7oAlU
5.6.2 Reversible reactions and dynamic equilibrium	-Identify and give examples of reversible reactions -Apply the conservation of energy to reversible reactions -Define dynamic equilibrium -Describe Le Chatelier's principle -Describe and explain the effect of changing the following conditions on equilibrium; concentration, temperature, pressure	263-265	https://www.bbc.co.uk/bitesize/guides/z32bpbk/revision/1	https://www.youtube.com/watch?v=66qcNNJFy6E GCSE Science Revision Chemistry "Concentration and Reversible Reactions" – YouTube GCSE Science Revision Chemistry "Pressure and Reversible Reactions" – YouTube GCSE Science Revision Chemistry "Temperature and reversible reactions" – YouTube GCSE Chemistry - Le Chatelier's Principle #42 (Higher Tier) – YouTube

Spec point	Concepts	CGP revision guide pages	Bitesize	YouTube
5.7.1 Carbon compounds as fuels and feedstock	-describe crude oil as a mixture of different length hydrocarbons -define the term hydrocarbon -identify the first 4 alkanes from their chemical formula and name them -Describe the trend in properties as hydrocarbon chain length increases -Describe and explain the process of fractional distillation -describe the process of cracking -describe the use of alkenes	267-270	https://www.bbc.co.uk/bitesize/guides/zxd4y4j/revision/1	https://www.youtube.com/watch?v=CX2IYWggEBc https://www.youtube.com/watch?v=3I7yCkSXPos https://www.youtube.com/watch?v=7AWwjKbRa_o
5.8.1 Purity, formulations and chromatography	-Define the term pure substance in chemistry -Use melting and boiling point data to identify pure and impure substances -Define the term formulation and give examples	273 275	https://www.bbc.co.uk/bitesize/guides/zp2wrwx/revision/1	https://www.youtube.com/watch?v=3oJxWwcnfJY
Required Practical 12: investigate how paper chromatography can be used to separate and tell the difference between coloured substances.	-Describe the properties of the mixtures that chromatography can be used to separate -Describe and explain the experimental process of chromatography -Explain how substances are separated using chromatography -Interpret chromatograms + -Calculate Rf values	275	https://www.bbc.co.uk/bitesize/guides/zp2wrwx/revision/3	https://www.youtube.com/watch?v=TdJ57SQ6GAQ https://www.youtube.com/watch?v=pnTGNAfu6GE
5.9.1 The composition and evolution of the Earth's Atmosphere	-describe the composition of the current atmosphere -describe the composition of the early atmosphere and explain theories of how the early atmosphere formed -explain how the early atmosphere changed to that of the present atmosphere	278	https://www.bbc.co.uk/bitesize/guides/z9pk3k7/revision/1	https://www.youtube.com/watch?v=t1Z3GlNldLA https://www.youtube.com/watch?v=l0h_-3M0Pso
5.10.1 Using the Earth's resources and obtaining potable water	-Describe the renewable and non-renewable resources that we get form the Earth and its atmosphere -Define the term potable water -Describe how potable water can be produced. -Describe the differences in the treatment of waste water, salt water and ground water -Describe and evaluate alternative methods of extracting metals e.g. phytomining and bioleaching	286 292-294	https://www.bbc.co.uk/bitesize/guides/zswfxfr/revision/1 https://www.bbc.co.uk/bitesize/guides/zg6cfcw/revision/1 Biological methods of metal extraction - Higher - Ways of reducing the use of resources - AQA - GCSE Combined Science Revision - AQA Trilogy - BBC Bitesize	https://www.youtube.com/watch?v=-XczTGavTZU https://www.youtube.com/watch?v=n7pYRQs20bI https://www.youtube.com/watch?v=b5RVPauf4oM

Exam date: 20th June

This specification points will **not be assessed** on this paper.

Spec point	CGP Revision Guide Pages
5.8.2 Identification of common gases	274

These areas **may still be assessed** in multiple choice questions/linked to a previous answer, so cannot be completely ignored in your revision.

Content	CGP Revision Guide Pages
Climate Change and Greenhouse Gases	280
Carbon footprint Air Pollution	282-284
LCA and Recycling	287-289

Physics

Higher paper 2		
MAJOR FOCUS		Revision Pages
6.5.1 Forces and their interactions	• Scalar quantities – magnitude only (mass, time, temperature, speed, distance) • Vector quantities – magnitude and direction (weight, force, velocity, acceleration, displacement) • Contact forces – objects physically touching – friction, drag, tension, normal contact force • Non-contact forces – not touching – magnetism, gravity, electrostatic force • Mass is constant, weight is the force acting on a mass due to gravity, with weight and mass being directly proportional • Weight = mass x gravitational field strength (W = m x g) • Multiple forces acting on an object can be replaced by a single, resultant force • Describe example of forces acting on objects • Draw free body diagrams (arrows to represent forces) • A single force can be broken into two forces acting at right angles • Multiple forces can be resolved into a single resultant force using scale vector diagrams	347-349

6.5.4.1 Describing motion along a line	• Explain difference between distance (scalar) and displacement (vector)
	• Explain difference between speed (scalar) and displacement (vector)
	• Typical values (all can vary)
	  ○ Walking ≈ 1.5 m/s
	  ○ Running ≈ 3 m/s
	  ○ Cycling ≈ 6 m/s
	  ○ Sound in air ≈ 330 m/s
	• For object moving at constant speed, distance can found using distance = speed x time (s = v x t)
	• Motion in a circle involves constant speed but change in velocity due to change in direction (i.e. car going around roundabout)
	• A journey in a straight line can be represent by a distance-time graph
	• Speed can be found from the gradient of the distance-time graph
	• If the object is accelerating (curved line) speed can be found by drawing a tangent
	• Acceleration = change in velocity/time (a = $\frac{v-u}{t}$)
	• Acceleration can be calculated from gradient of velocity-time graph
	• Distance travelled can be calculated by finding the area under a velocity-time graph – this can be found by counting squares or using geometry
	• (Final velocity)^2 – (initial velocity)^2 = 2 x acceleration x distance ($v^2 – u^2 = 2 \times a \times s$)
	• Falling objects accelerate due to force of gravity. Eventually weight = drag, resultant force = zero and object reaches terminal velocity
		356-360

6.5.4.2 Forces, accelerations and Newton's laws of motion	• Newton's First Law: If the resultant force acting on an object is zero and:
	  ○ Object is stationary, it remains stationary
	  ○ Object is moving, it continues moving at same velocity
	• Velocity only changes if force acts on object
	• Tendency of objects to continue in state of rest or uniform motion called inertia
	• Newton's Second Law: acceleration is proportional to resultant force
	• Force = mass x acceleration (F = m x a)
	• Inertial mass – measure of how difficult it is to change velocity of object (ratio of force over acceleration)
	• Newton's Third Law – when two objects interact, they exert an equal and opposite force on each other
		362-363

6.5.5 Momentum	• Momentum = mass x velocity (p = m x v) • Momentum before/after collision is always the same	Not in guide

6.6.2 Electromagnetic waves	• All EM waves are transverse, travel at speed of light (3 x 10^8 m/s) in vacuum or air
	• Grouped by wavelength/frequency
	• In order, from long wavelength (low frequency) to short (high frequency) – radio, micro, infra-red, visible, UV, x-ray, gamma)
	• Different materials absorb/reflect/transmit/refract EM waves in different ways
	• Refraction is due to waves slowing down/speeding up
	• Refraction diagrams – less dense to more dense, moves towards normal – more dense to less dense, moves away from the normal
	• Light slows down when it moves into more dense medium/speeds up when moves into less dense
	• Radio waves – produced by oscillations in electronic circuits. When absorbed, cause AC current with same frequency as wave.
	• UV/X-ray/Gamma – can have hazardous effort on human tissue, depending on size of dose/type of radiation.
	• Radiation measured in Sieverts – 1000 milli Sievert (1000 mSV) = 1 Sievert (1 Sv)
	• UV can cause skin to age prematurely and lead to skin cancer. X-ray/gamma both ionising – can cause cancer/mutation of genes.
	• Uses of EM spectrum
	  ○ Radio – TV and radio
	  ○ Microwave – satellite, wi-fi, mobile phone, heating food
	  ○ Infra-red – electrical heaters, cooking food, IR cameras, remote controls
	  ○ Visible light – telescopes, fibre optics
	  ○ UV – energy efficient lamps, sun-tan beds
	  ○ X-ray & Gamma – medical imaging and treatments
	• Explain why each type of EM is suitable for its role
		378-383

6.7.2 The motor effect	• When a current flows through a wire a magnetic field is produced around the wire. • Shaping the wire into a solenoid (coil) increases the strength of the magnetic field – the field inside the solenoid is strong and uniform • Adding an iron core increases the strength of the solenoid – this is an electromagnet • When a wire carrying an electromagnet is placed in a magnetic field the field and conductor exert a force on each other – this is the motor effect • Fleming's left-hand rule show the direction of the force (thumb), field (first finger) and current (middle finger) • Force = magnetic flux density x current x length (F = B x I x l) • A coil carrying a current in a magnetic field will rotate – this is the basis of electric motors	388-389
Required Practical	• Investigate how the amount of infra-red radiation absorbed or radiated by a surface depends on the nature of the surface	381-382
	Low Tariff/Linked Topics	
6.5.2 Work done and energy transfer	• Work is done on an object when a force causes it to move. • Work done = force x distance (W = F x s) • 1 joule of work done = 1 Newton metre • Work done against friction causes a rise in temperature	349
6.6.1 Waves in air, fluids and solids	• Transverse – vibrate perpendicular (90°) to direction of energy transfer. Peaks/troughs. Water waves, all electromagnetic waves. • Longitudinal – vibrate parallel to direction of energy transfer. Compressions/rarefactions. Needs particles (mechanical). Sound waves/ultrasound. • Amplitude – distance from rest point of wave to peak. • Wavelength – distance from peak to peak • Frequency – number of waves passing a point per second • Period = 1/frequency (T = 1/f) • Wave speed = frequency x wavelength (v = f x λ)	371-374

NOT ON EXAM		
6.5.3 Forces and elasticity	• Give examples of forces involved in stretching and compressing • Describe difference in elastic and inelastic deformation • Extension of spring is directly proportional to force applied as long of limit of proportionality not exceeded • Force = spring constant x extension (F = k x e) • Force on spring does work, and elastic store of spring fills • Elastic potential energy = 0.5 x spring constant x extension^2 (E_e = 0.5 x k x e^2) •	351-353
6.5.4.3 Forces and Braking	• Stopping distance = thinking distance + braking distance • Thinking distance – people naturally having different reaction times, tiredness, drugs, alcohol, distractions, speed of car • Braking distance – adverse road conditions (rain/ice/snow) condition of brakes, condition of tyres, speed of car • When brakes pressed, friction between brakes and wheel transfers energy from kinetic store to thermal store (car slows, brakes get hot) • Large deceleration can lead to brakes overheating/loss of control of car	368-369
6.7.1 Permanent and induced magnetism, magnetic forces and fields	• Magnets have north and south poles • Poles are where magnets are strongest • North & north/south & south repel • North & south attract • Permanent magnet – has own magnetic field • Induced magnet – becomes a magnet when placed in magnetic field. Always causes force of attraction. Loses magnetism quickly when removed from magnetic field • Region around magnet where force acts is called magnetic field – strength of field depends on distance from magnet • Direction of field line is north to south	386-387